FIG. 1

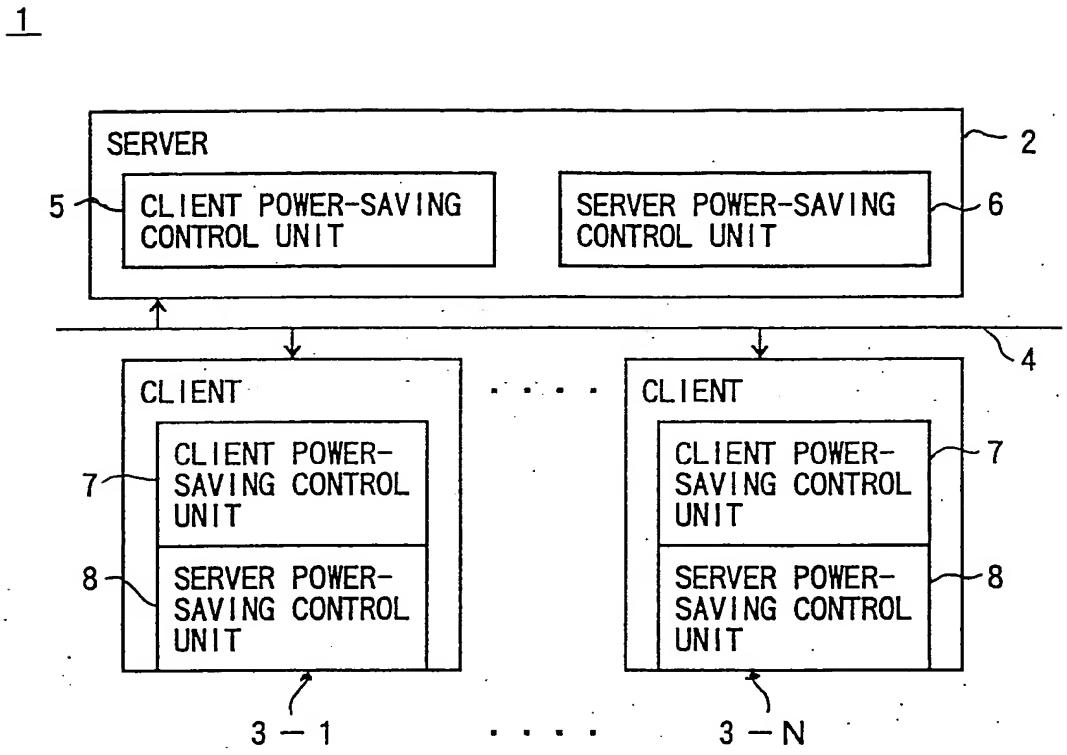

1
SERVER
2
5
CLIENT POWER-SAVING CONTROL UNIT
SERVER POWER-SAVING CONTROL UNIT
6
4
CLIENT
CLIENT
7
CLIENT POWER-SAVING CONTROL UNIT
8
SERVER POWER-SAVING CONTROL UNIT
3 — 1
3 — N

FIG. 2

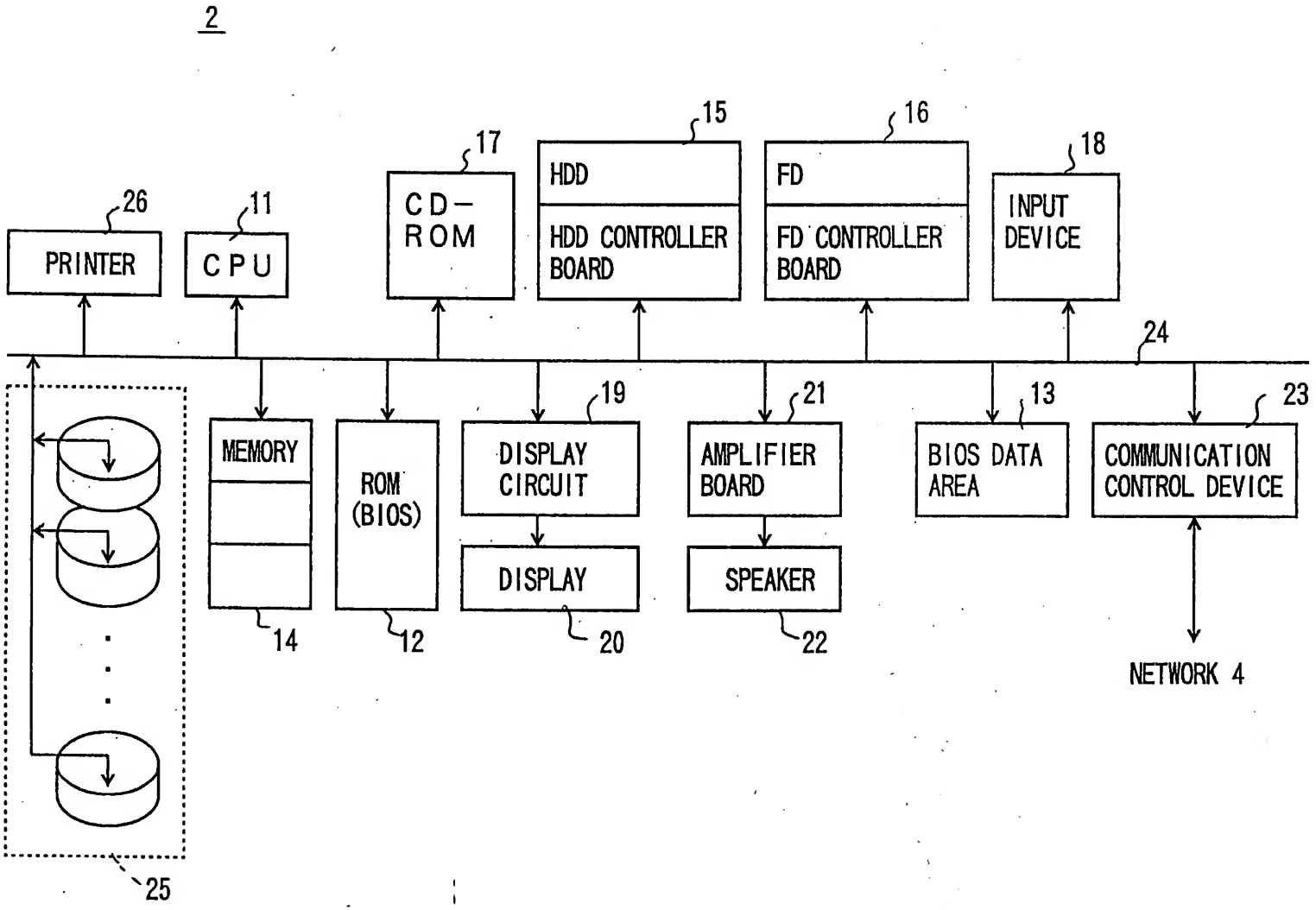

2
26
PRINTER
11
CPU
17
CD-ROM
15
HDD
HDD CONTROLLER BOARD
16
FD
FD CONTROLLER BOARD
18
INPUT DEVICE
24
MEMORY
14
ROM (BIOS)
12
19
DISPLAY CIRCUIT
DISPLAY
20
21
AMPLIFIER BOARD
SPEAKER
22
13
BIOS DATA AREA
23
COMMUNICATION CONTROL DEVICE
NETWORK 4
25

FIG. 3

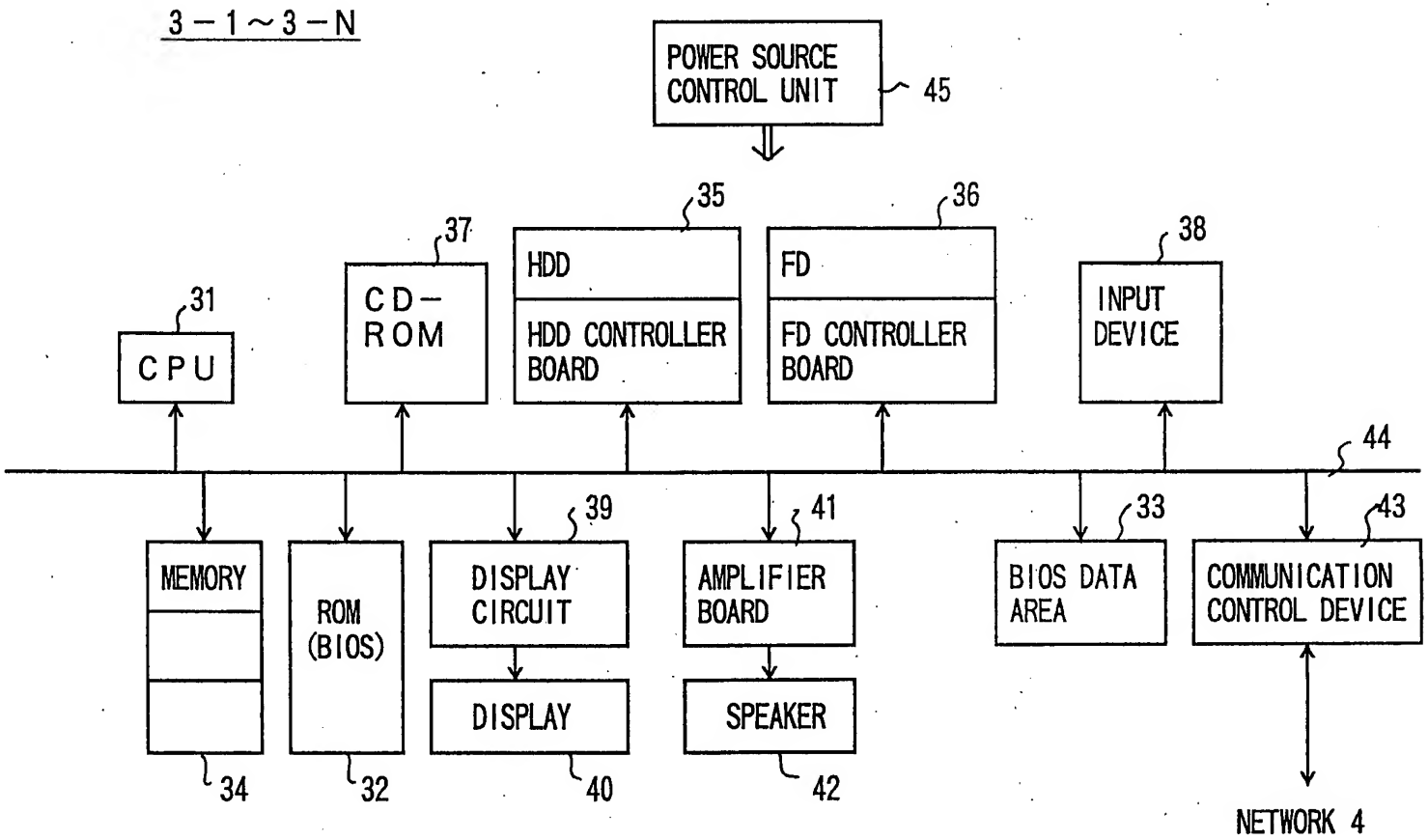

3－1～3－N
POWER SOURCE CONTROL UNIT
45
35
36
37
38
HDD
HDD CONTROLLER BOARD
FD
FD CONTROLLER BOARD
CD－ROM
INPUT DEVICE
31
CPU
44
39
41
33
43
MEMORY
ROM (BIOS)
DISPLAY CIRCUIT
AMPLIFIER BOARD
BIOS DATA AREA
COMMUNICATION CONTROL DEVICE
DISPLAY
SPEAKER
34
32
40
42
NETWORK 4

FIG. 4

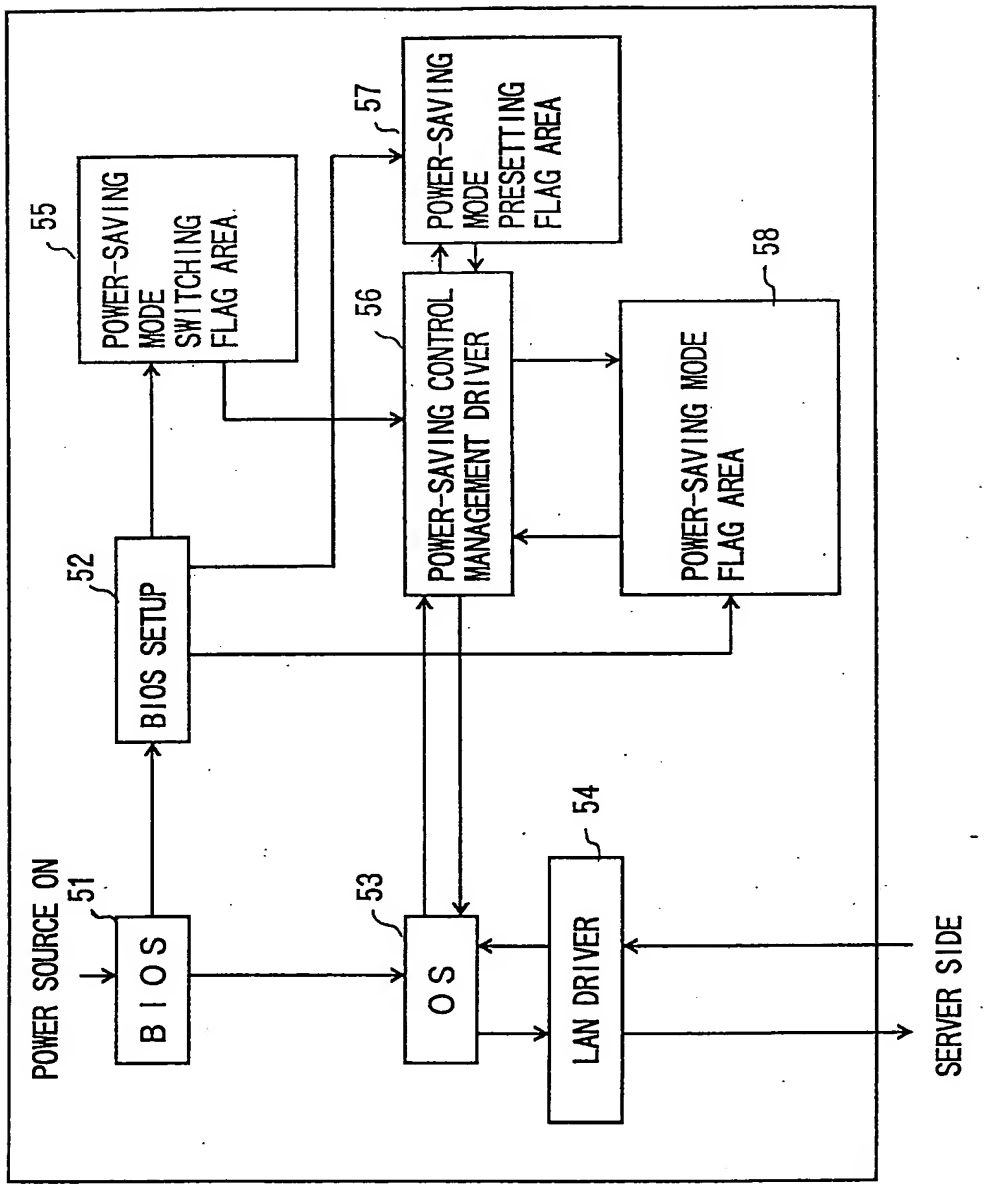

POWER SOURCE ON
51
BIOS
52
BIOS SETUP
53
OS
54
LAN DRIVER
SERVER SIDE
55
POWER-SAVING MODE SWITCHING FLAG AREA
56
POWER-SAVING CONTROL MANAGEMENT DRIVER
57
POWER-SAVING MODE PRESETTING FLAG AREA
58
POWER-SAVING MODE FLAG AREA

FIG. 5

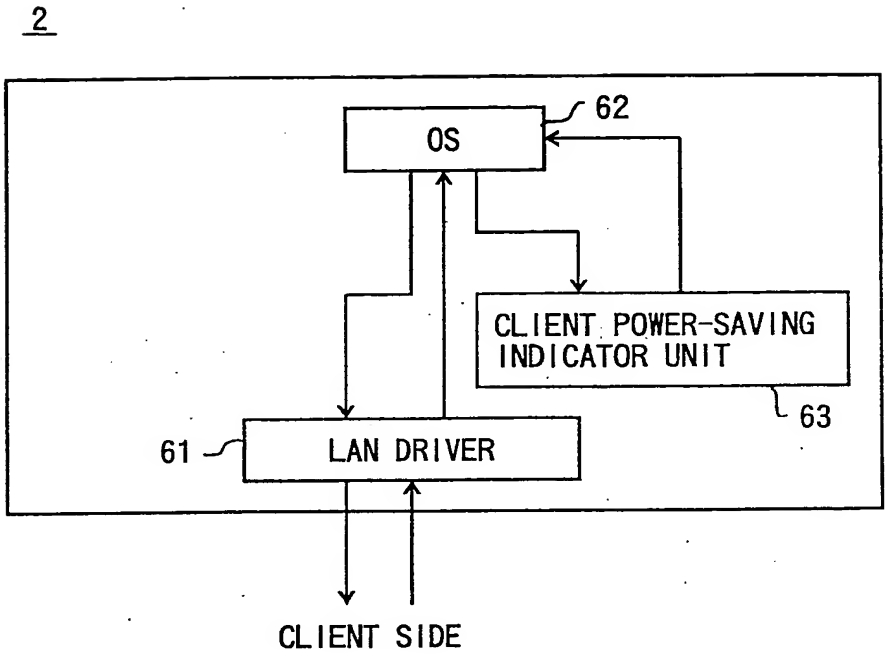

2
62
OS
CLIENT POWER-SAVING INDICATOR UNIT
63
61
LAN DRIVER
CLIENT SIDE

FIG. 6

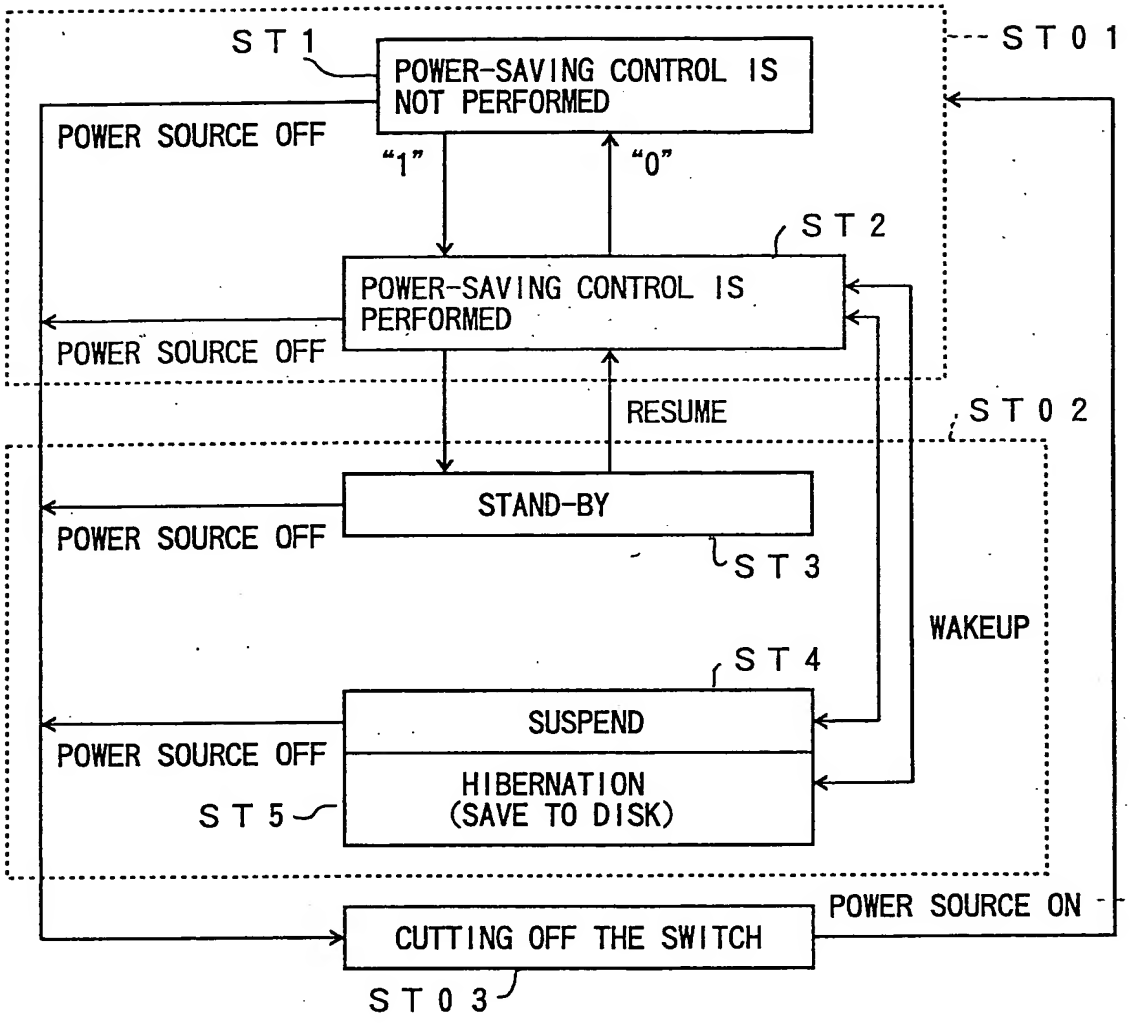

ST1
POWER-SAVING CONTROL IS NOT PERFORMED
ST01
POWER SOURCE OFF
"1"
"0"
ST2
POWER-SAVING CONTROL IS PERFORMED
POWER SOURCE OFF
RESUME
ST02
STAND-BY
POWER SOURCE OFF
ST3
WAKEUP
ST4
SUSPEND
POWER SOURCE OFF
HIBERNATION (SAVE TO DISK)
ST5
POWER SOURCE ON
CUTTING OFF THE SWITCH
ST03

FIG. 7A

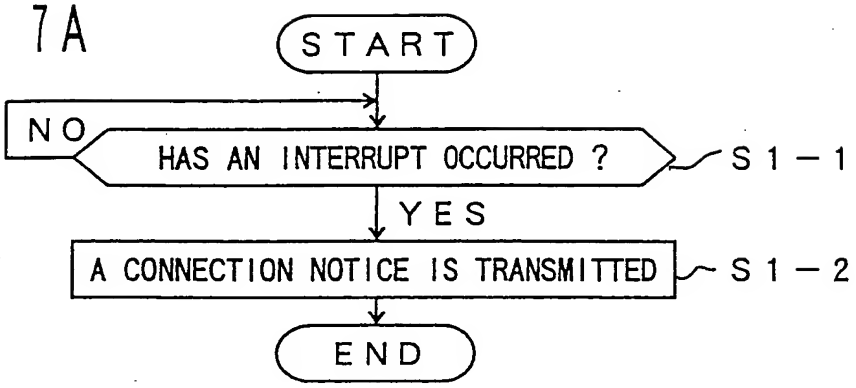


FIG. 7B

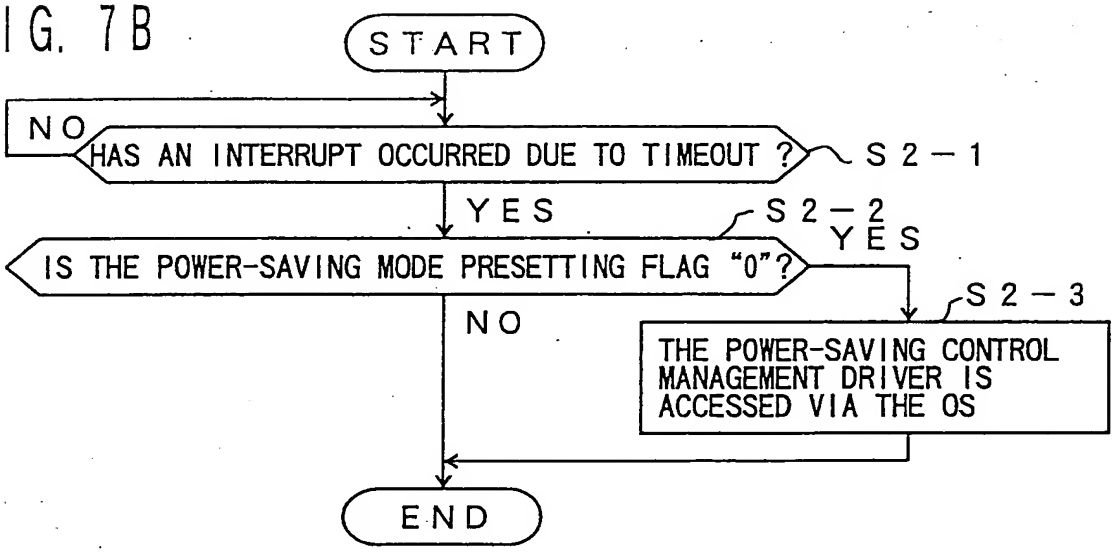


FIG. 7C

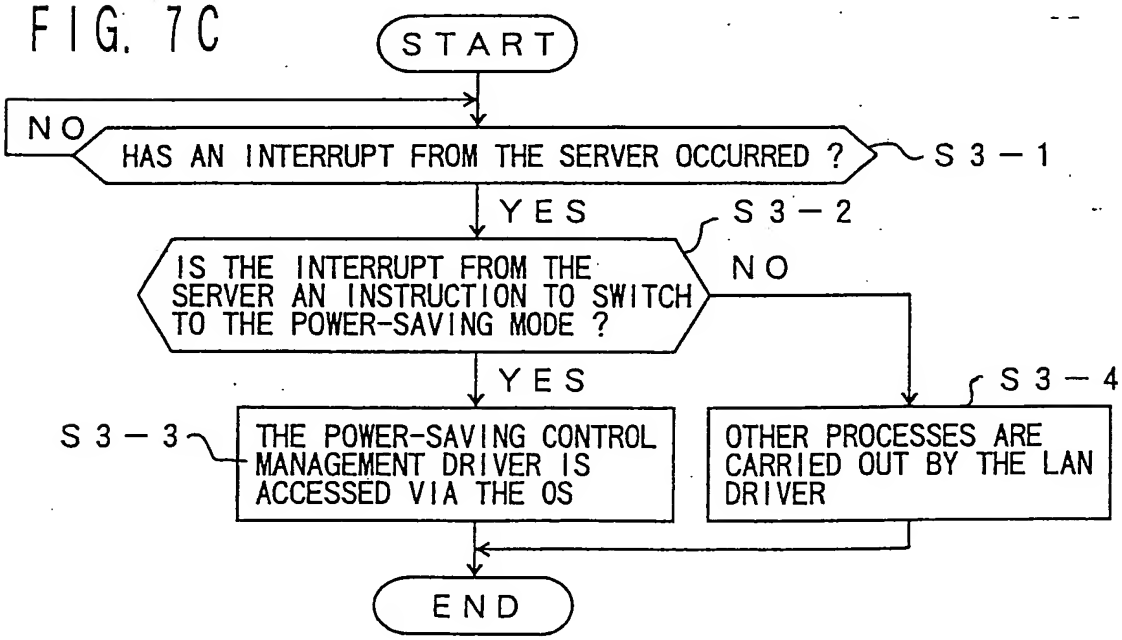


FIG. 8

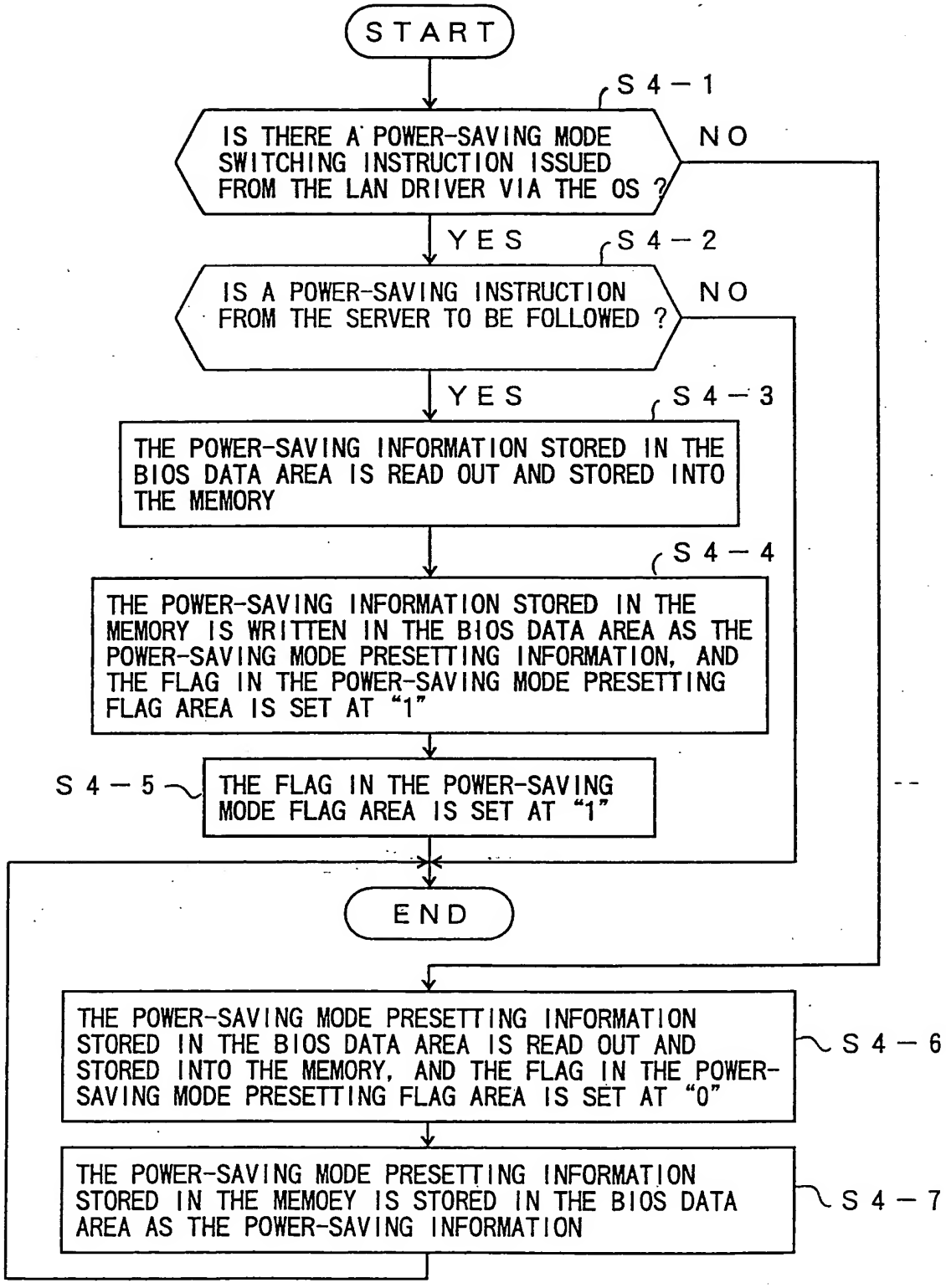

START
S 4 − 1
IS THERE A POWER-SAVING MODE SWITCHING INSTRUCTION ISSUED FROM THE LAN DRIVER VIA THE OS ?
NO
YES
S 4 − 2
IS A POWER-SAVING INSTRUCTION FROM THE SERVER TO BE FOLLOWED ?
NO
YES
S 4 − 3
THE POWER-SAVING INFORMATION STORED IN THE BIOS DATA AREA IS READ OUT AND STORED INTO THE MEMORY
S 4 − 4
THE POWER-SAVING INFORMATION STORED IN THE MEMORY IS WRITTEN IN THE BIOS DATA AREA AS THE POWER-SAVING MODE PRESETTING INFORMATION, AND THE FLAG IN THE POWER-SAVING MODE PRESETTING FLAG AREA IS SET AT "1"
S 4 − 5
THE FLAG IN THE POWER-SAVING MODE FLAG AREA IS SET AT "1"
END
THE POWER-SAVING MODE PRESETTING INFORMATION STORED IN THE BIOS DATA AREA IS READ OUT AND STORED INTO THE MEMORY, AND THE FLAG IN THE POWER-SAVING MODE PRESETTING FLAG AREA IS SET AT "0"
S 4 − 6
THE POWER-SAVING MODE PRESETTING INFORMATION STORED IN THE MEMOEY IS STORED IN THE BIOS DATA AREA AS THE POWER-SAVING INFORMATION
S 4 − 7

FIG. 9

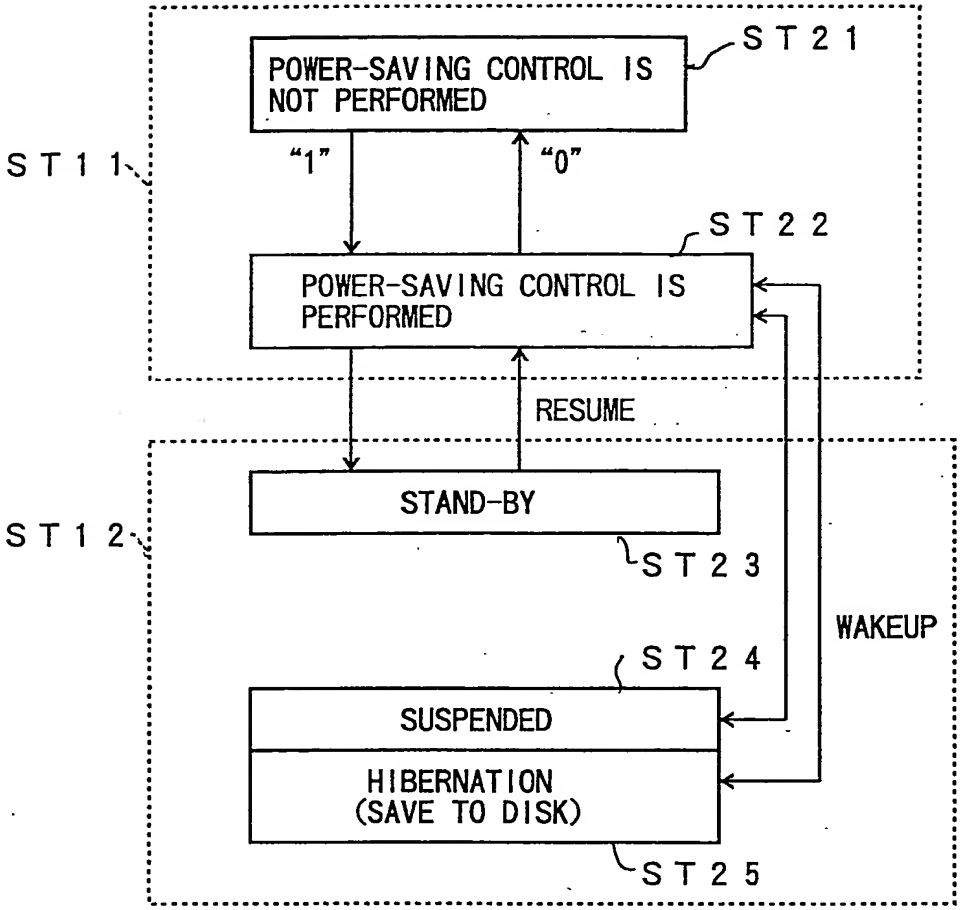

ST21
POWER-SAVING CONTROL IS NOT PERFORMED
ST11
"1"
"0"
ST22
POWER-SAVING CONTROL IS PERFORMED
RESUME
STAND-BY
ST12
ST23
WAKEUP
ST24
SUSPENDED
HIBERNATION (SAVE TO DISK)
ST25

FIG. 10

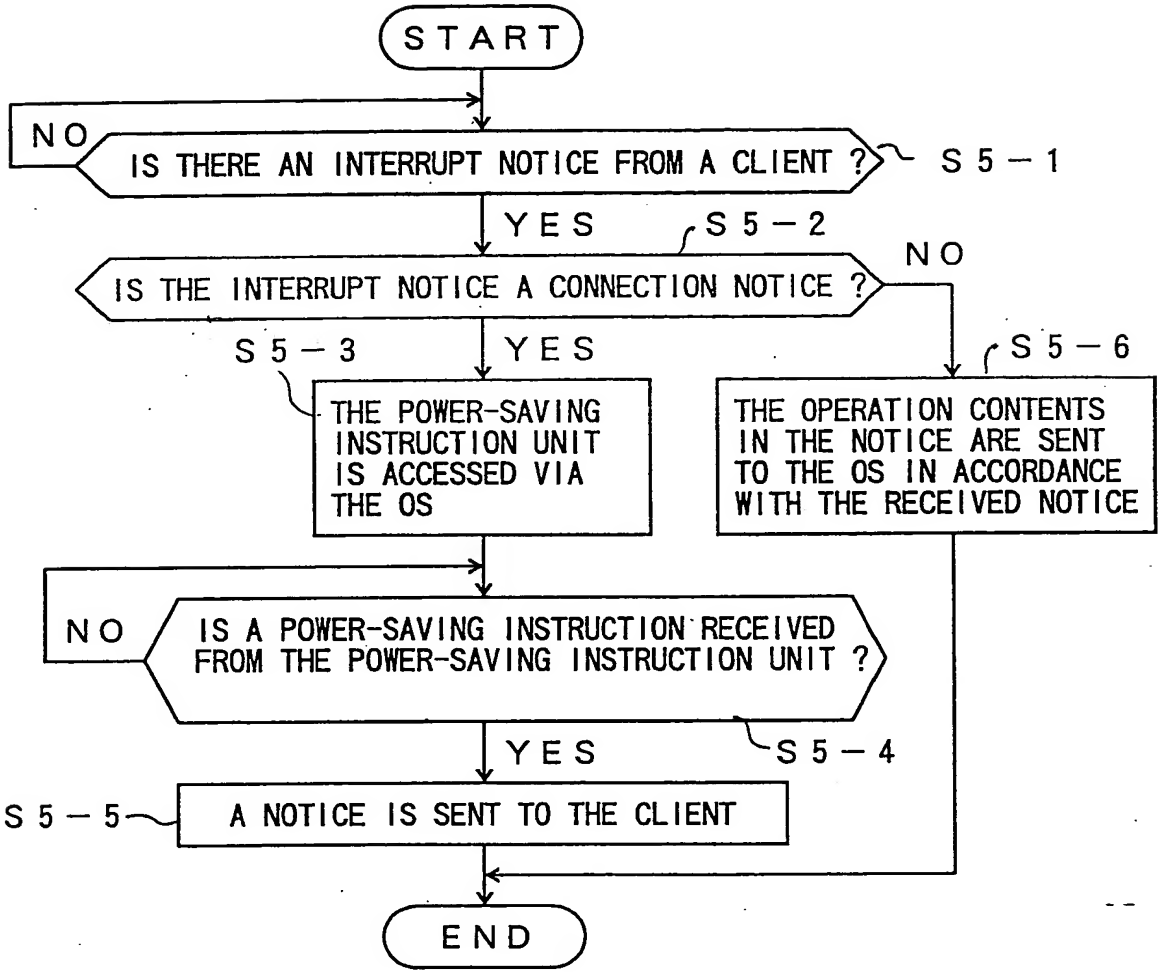

START
NO
IS THERE AN INTERRUPT NOTICE FROM A CLIENT ?
S 5 − 1
YES
S 5 − 2
IS THE INTERRUPT NOTICE A CONNECTION NOTICE ?
NO
S 5 − 3
YES
S 5 − 6
THE POWER-SAVING INSTRUCTION UNIT IS ACCESSED VIA THE OS
THE OPERATION CONTENTS IN THE NOTICE ARE SENT TO THE OS IN ACCORDANCE WITH THE RECEIVED NOTICE
NO
IS A POWER-SAVING INSTRUCTION RECEIVED FROM THE POWER-SAVING INSTRUCTION UNIT ?
S 5 − 4
YES
S 5 − 5
A NOTICE IS SENT TO THE CLIENT
END

FIG. 11

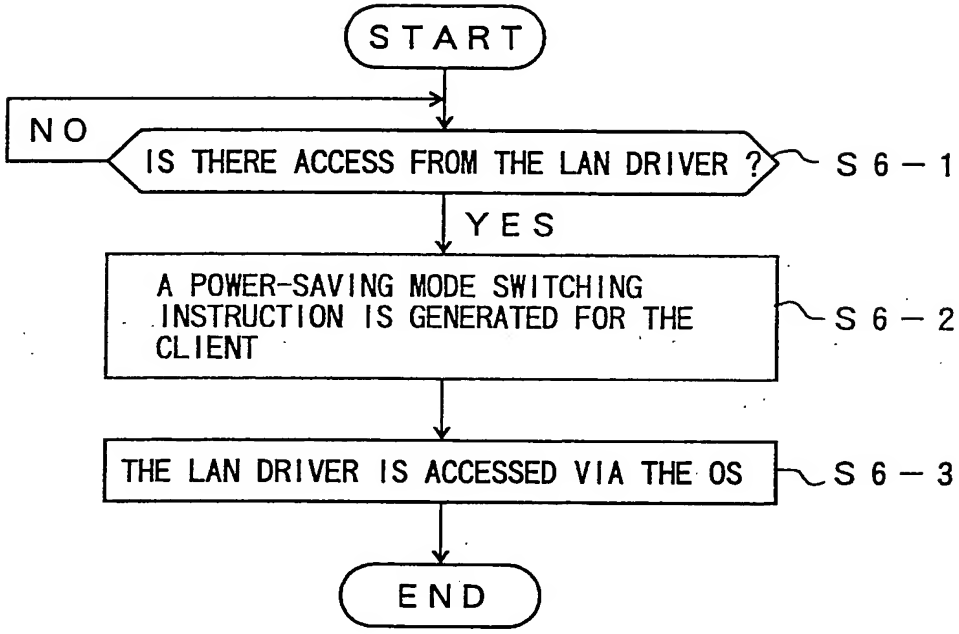

START
NO
IS THERE ACCESS FROM THE LAN DRIVER ?
S 6 – 1
YES
A POWER-SAVING MODE SWITCHING INSTRUCTION IS GENERATED FOR THE CLIENT
S 6 – 2
THE LAN DRIVER IS ACCESSED VIA THE OS
S 6 – 3
END

FIG. 12

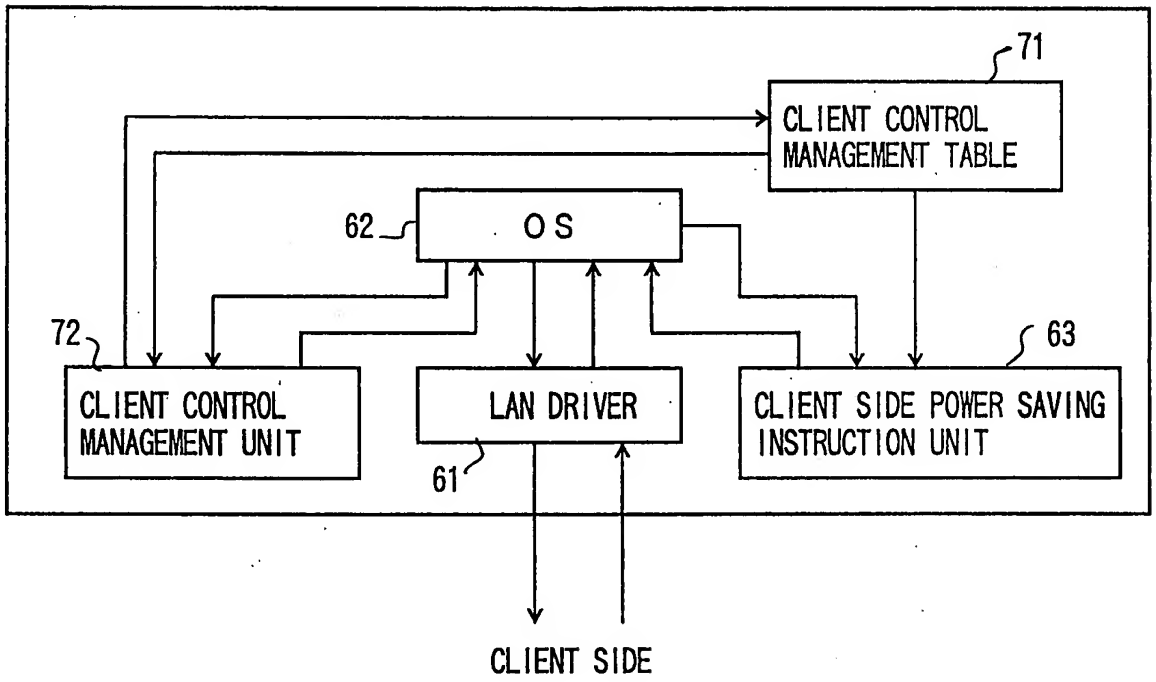
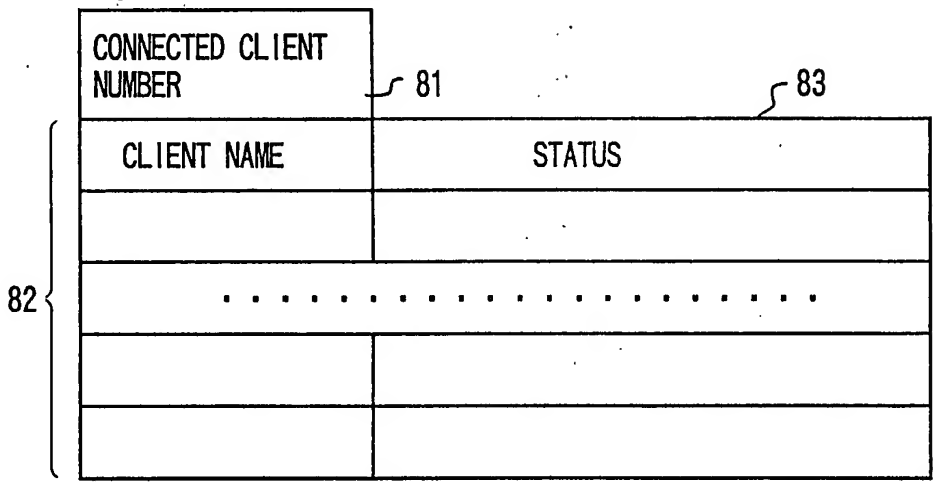

2
71
CLIENT CONTROL MANAGEMENT TABLE
62
OS
72
63
CLIENT CONTROL MANAGEMENT UNIT
LAN DRIVER
CLIENT SIDE POWER SAVING INSTRUCTION UNIT
61
CLIENT SIDE

FIG. 13A

CLIENT CONTROL MANAGEMENT TABLE 71



STATUS: SUSPENDED/STAND-BY/HIBERNATION/RESUME OR WAKEUP/CONNECTION START

FIG. 13B

00001 : CONNECTION START
00010 : SUSPENDED
00100 : STAND-BY
01000 : HIBERNATION
10010 : WAKEUP
10100 : RESUME
11000 : WAKEUP FROM HIBERNATION

FIG. 14

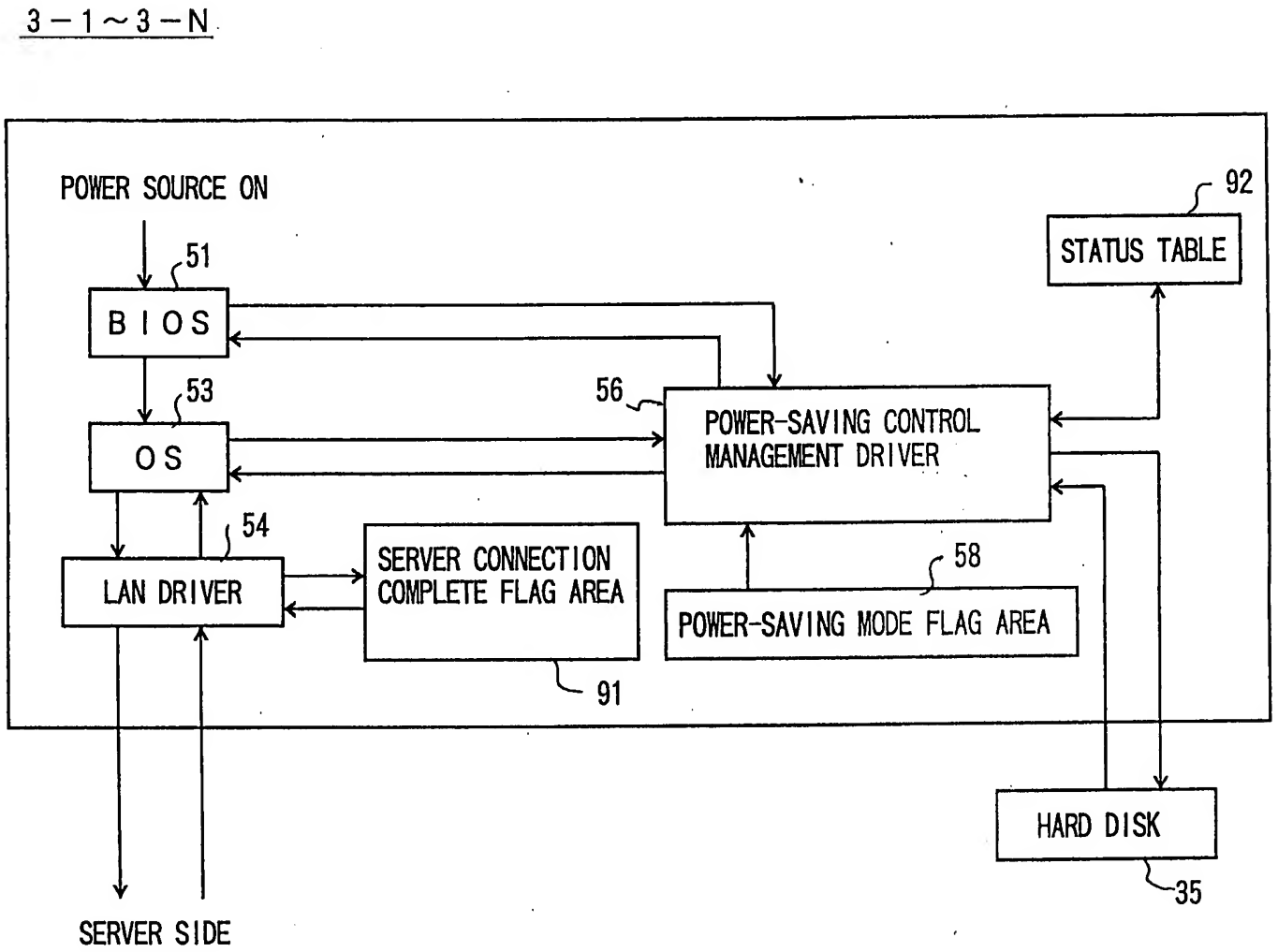

3－1～3－N
POWER SOURCE ON
51
BIOS
53
OS
54
LAN DRIVER
SERVER SIDE
SERVER CONNECTION COMPLETE FLAG AREA
91
56
POWER-SAVING CONTROL MANAGEMENT DRIVER
58
POWER-SAVING MODE FLAG AREA
92
STATUS TABLE
HARD DISK
35

FIG. 15

STATUS TABLE 92

00001/00010/00100/01000/10010/10100/11000

FIG. 16

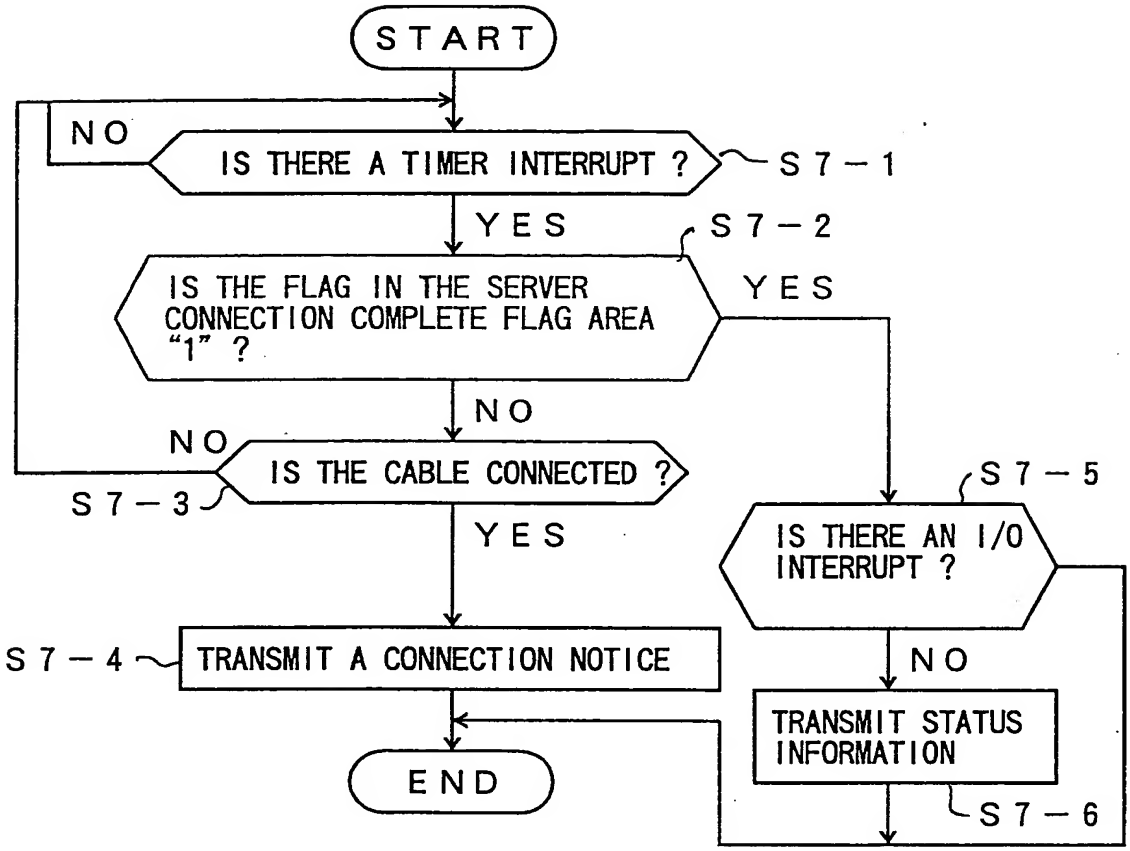

START
NO
IS THERE A TIMER INTERRUPT ?
S 7 – 1
YES
S 7 – 2
IS THE FLAG IN THE SERVER CONNECTION COMPLETE FLAG AREA "1" ?
YES
NO
NO
IS THE CABLE CONNECTED ?
S 7 – 3
YES
S 7 – 5
IS THERE AN I/O INTERRUPT ?
S 7 – 4
TRANSMIT A CONNECTION NOTICE
NO
TRANSMIT STATUS INFORMATION
S 7 – 6
END

FIG. 17

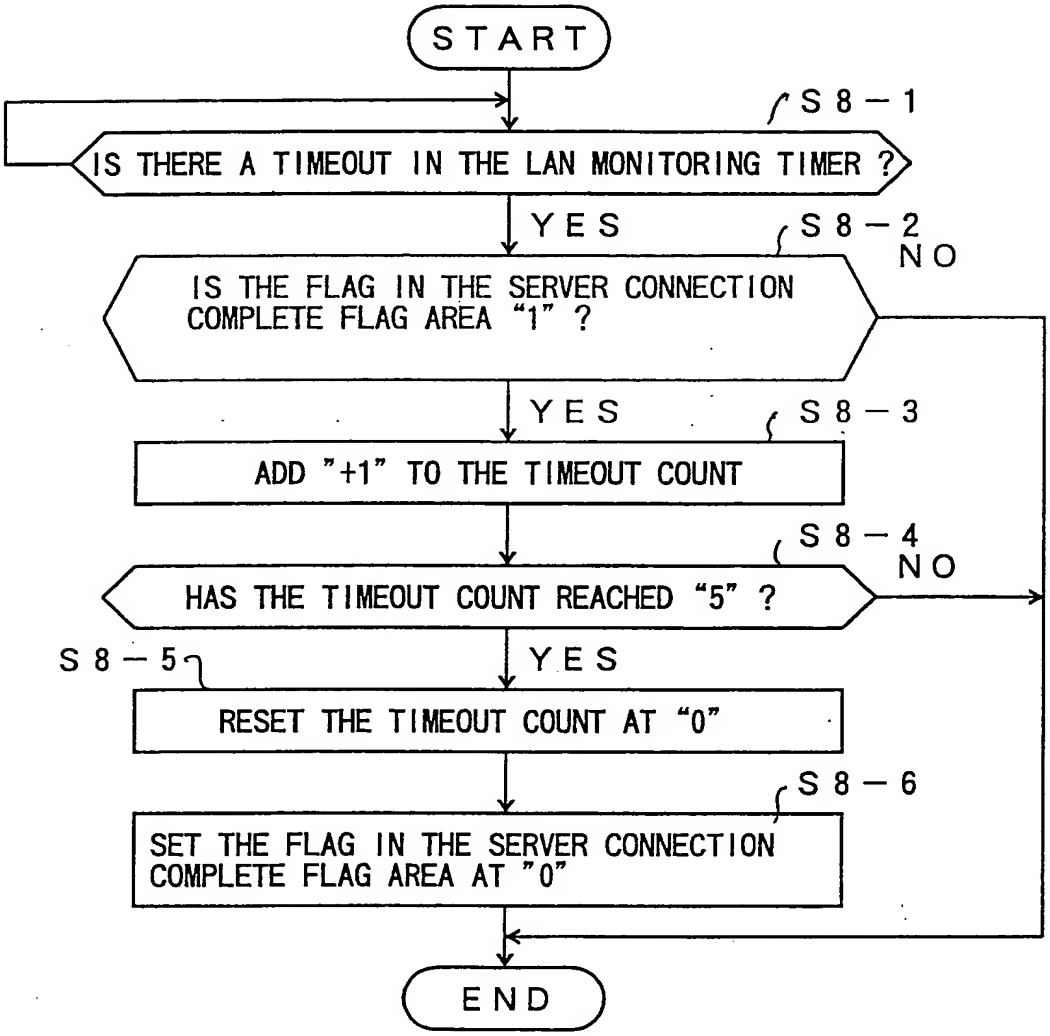

START
S8-1
IS THERE A TIMEOUT IN THE LAN MONITORING TIMER ?
YES
S8-2
NO
IS THE FLAG IN THE SERVER CONNECTION COMPLETE FLAG AREA "1" ?
YES
S8-3
ADD "+1" TO THE TIMEOUT COUNT
S8-4
NO
HAS THE TIMEOUT COUNT REACHED "5" ?
S8-5
YES
RESET THE TIMEOUT COUNT AT "0"
S8-6
SET THE FLAG IN THE SERVER CONNECTION COMPLETE FLAG AREA AT "0"
END

FIG. 18

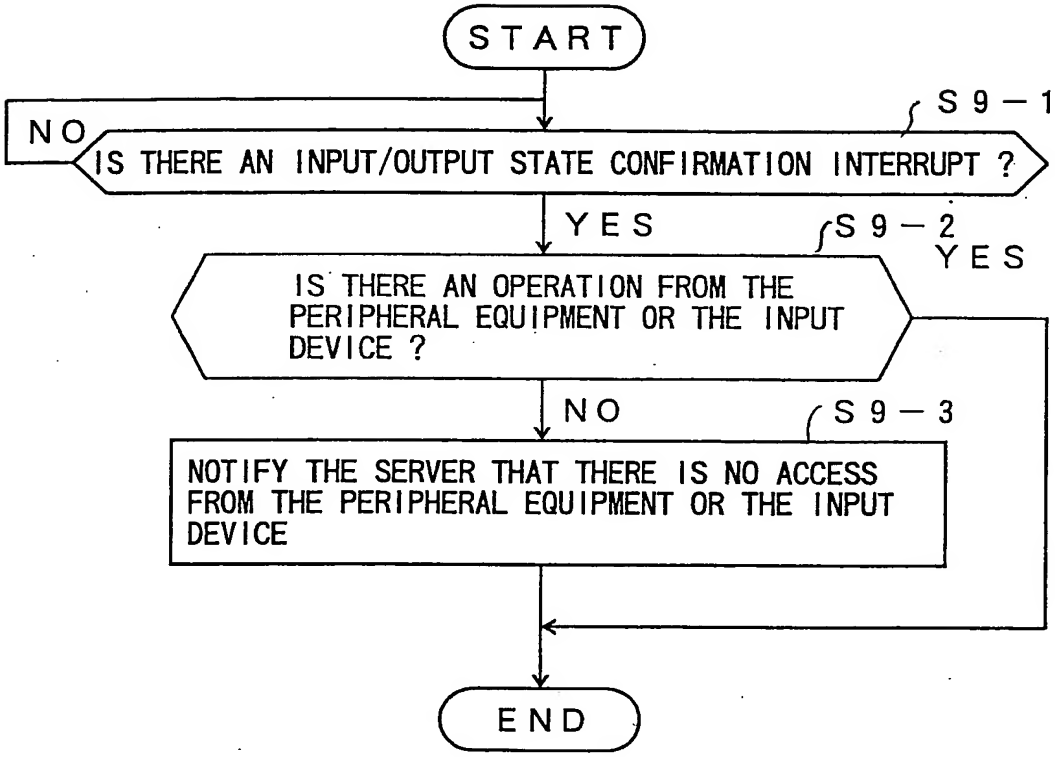

START
S9-1
NO
IS THERE AN INPUT/OUTPUT STATE CONFIRMATION INTERRUPT ?
YES
S9-2
YES
IS THERE AN OPERATION FROM THE PERIPHERAL EQUIPMENT OR THE INPUT DEVICE ?
NO
S9-3
NOTIFY THE SERVER THAT THERE IS NO ACCESS FROM THE PERIPHERAL EQUIPMENT OR THE INPUT DEVICE
END

FIG. 19

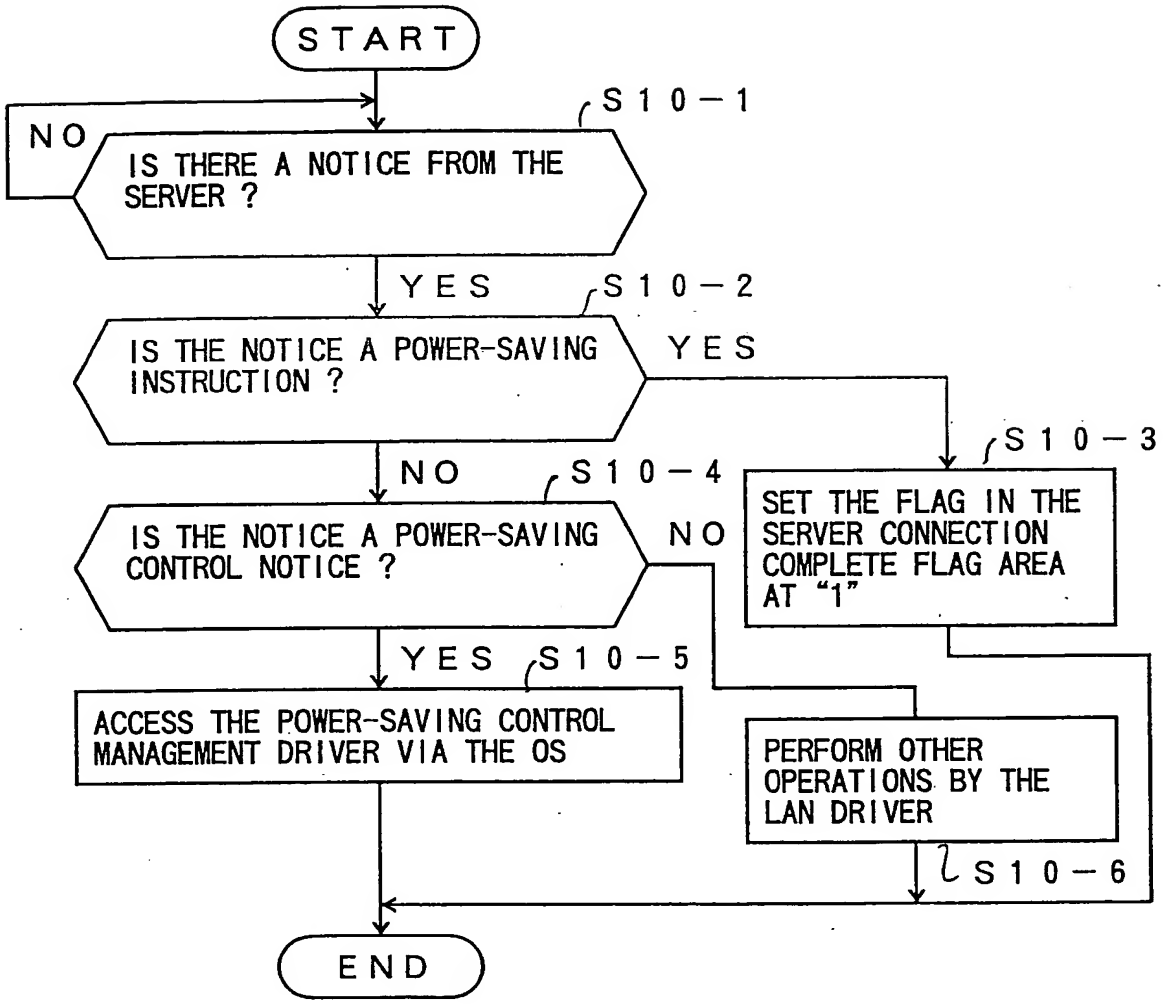

START
S10-1
NO
IS THERE A NOTICE FROM THE SERVER ?
YES
S10-2
IS THE NOTICE A POWER-SAVING INSTRUCTION ?
YES
S10-3
SET THE FLAG IN THE SERVER CONNECTION COMPLETE FLAG AREA AT "1"
NO
S10-4
IS THE NOTICE A POWER-SAVING CONTROL NOTICE ?
NO
YES
S10-5
ACCESS THE POWER-SAVING CONTROL MANAGEMENT DRIVER VIA THE OS
PERFORM OTHER OPERATIONS BY THE LAN DRIVER
S10-6
END

FIG. 20

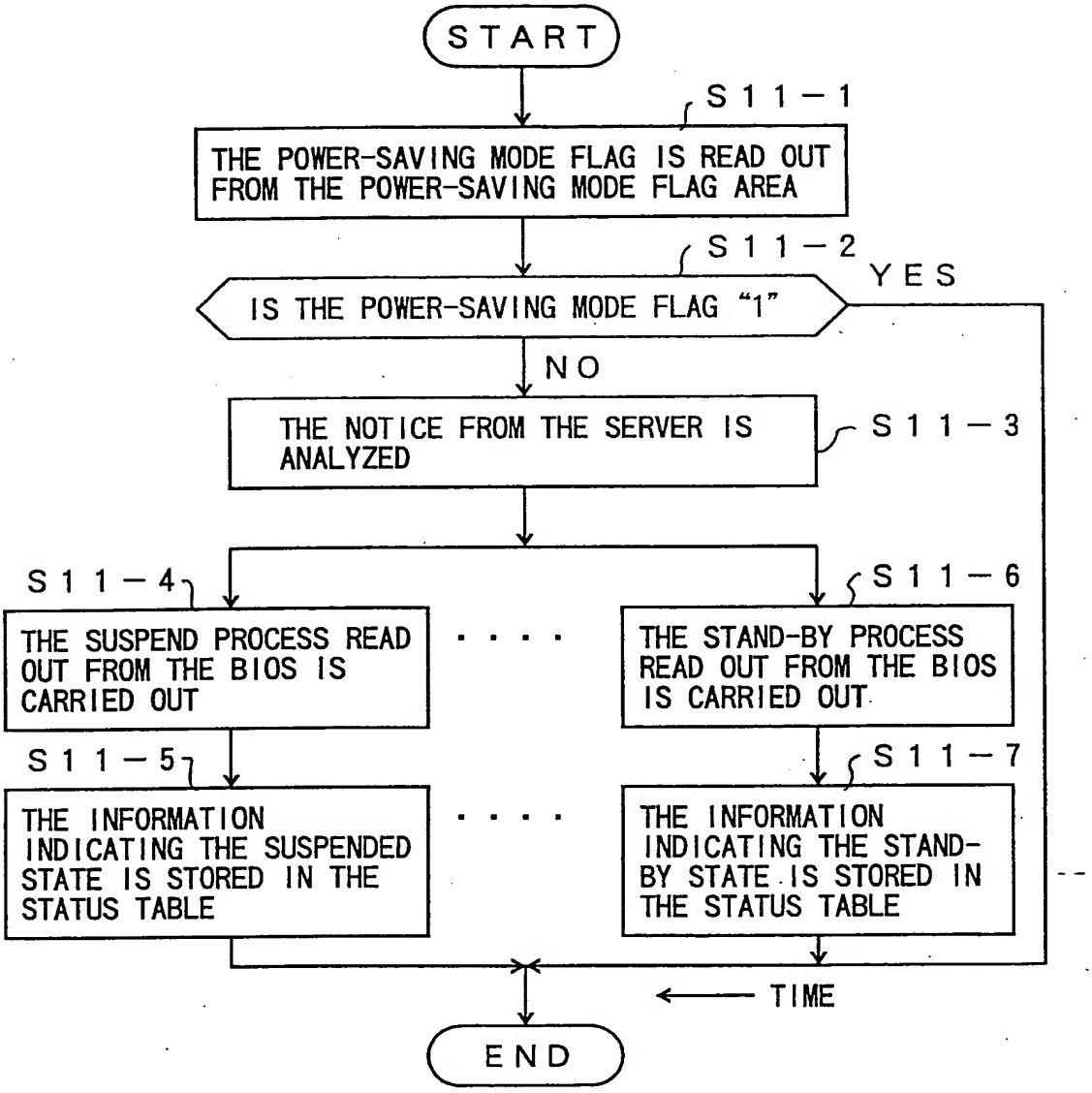

START
S11-1
THE POWER-SAVING MODE FLAG IS READ OUT FROM THE POWER-SAVING MODE FLAG AREA
S11-2
IS THE POWER-SAVING MODE FLAG "1"
YES
NO
THE NOTICE FROM THE SERVER IS ANALYZED
S11-3
S11-4
THE SUSPEND PROCESS READ OUT FROM THE BIOS IS CARRIED OUT
S11-5
THE INFORMATION INDICATING THE SUSPENDED STATE IS STORED IN THE STATUS TABLE
S11-6
THE STAND-BY PROCESS READ OUT FROM THE BIOS IS CARRIED OUT
S11-7
THE INFORMATION INDICATING THE STAND-BY STATE IS STORED IN THE STATUS TABLE
TIME
END

FIG. 21

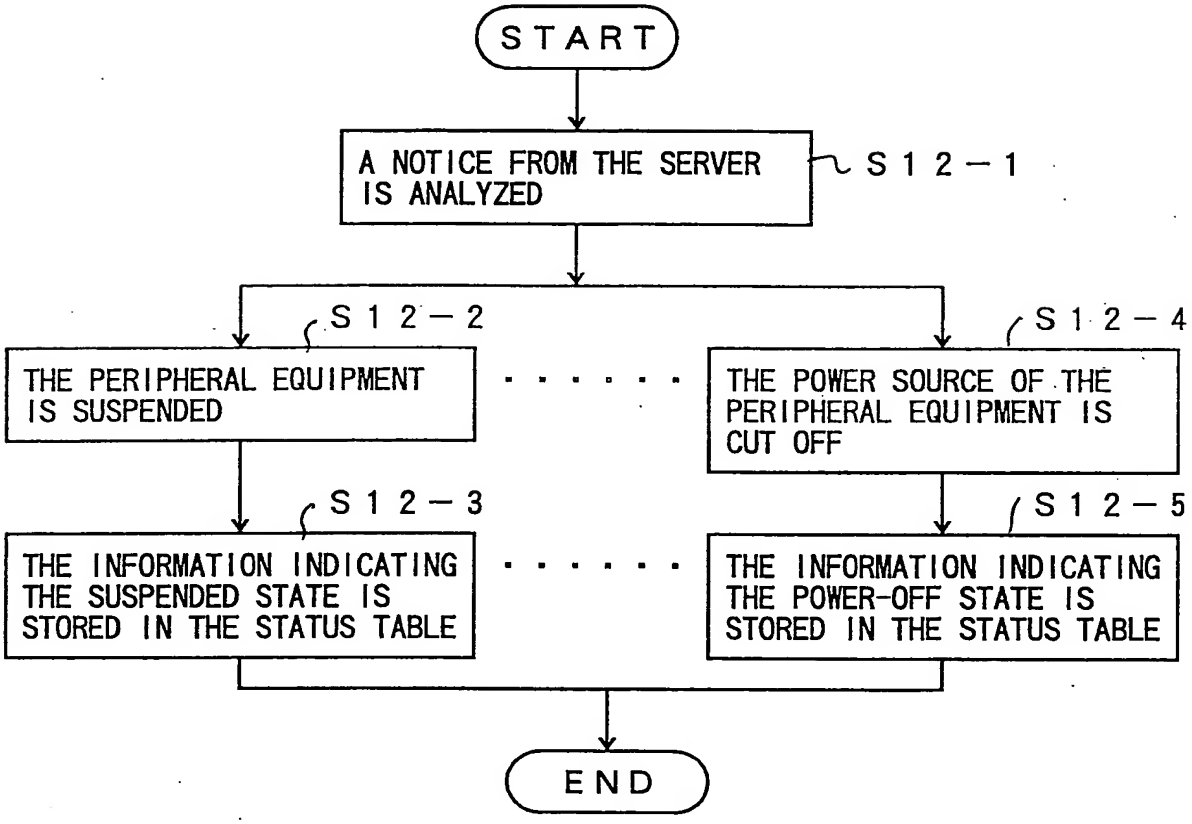

START
A NOTICE FROM THE SERVER IS ANALYZED
S12-1
S12-2
THE PERIPHERAL EQUIPMENT IS SUSPENDED
S12-4
THE POWER SOURCE OF THE PERIPHERAL EQUIPMENT IS CUT OFF
S12-3
THE INFORMATION INDICATING THE SUSPENDED STATE IS STORED IN THE STATUS TABLE
S12-5
THE INFORMATION INDICATING THE POWER-OFF STATE IS STORED IN THE STATUS TABLE
END

FIG. 22

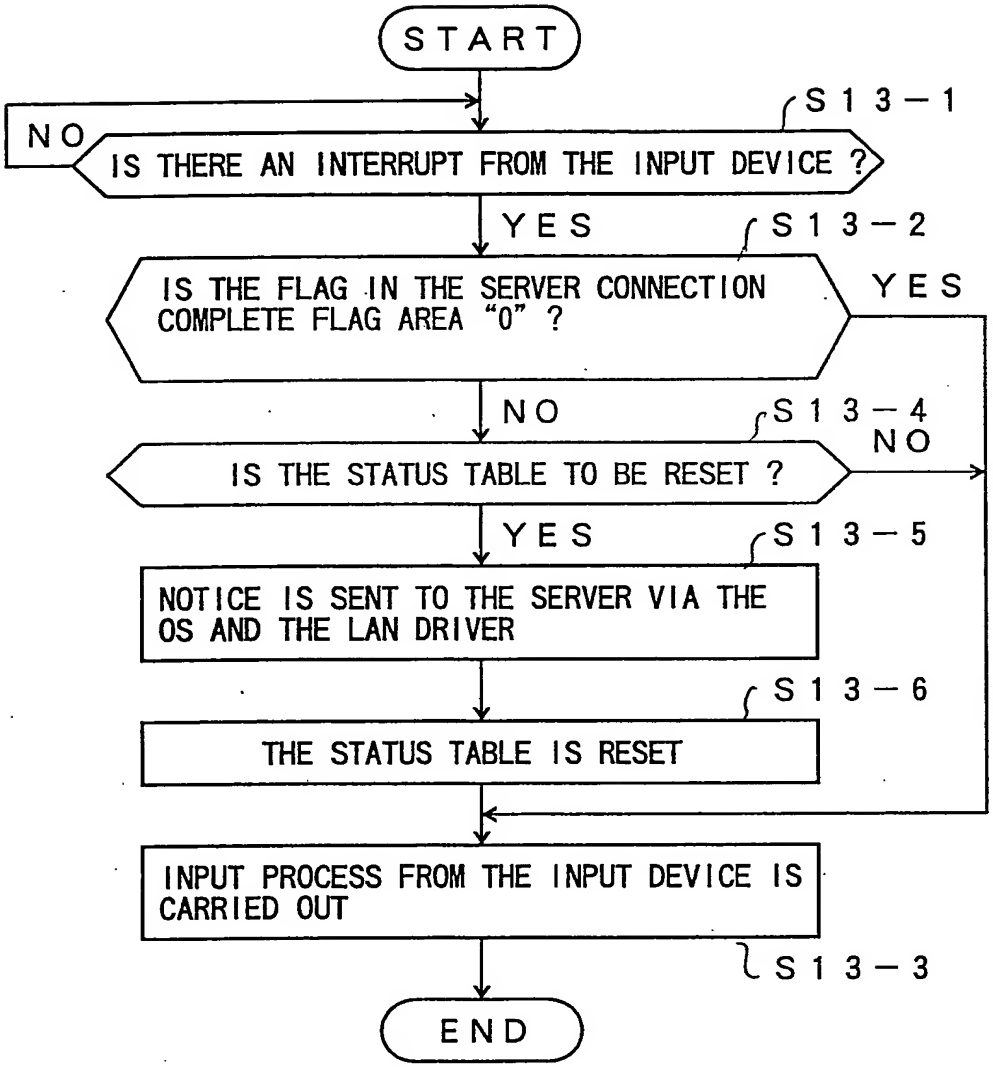

START
S13-1
NO
IS THERE AN INTERRUPT FROM THE INPUT DEVICE ?
YES
S13-2
IS THE FLAG IN THE SERVER CONNECTION COMPLETE FLAG AREA "0" ?
YES
NO
S13-4
NO
IS THE STATUS TABLE TO BE RESET ?
YES
S13-5
NOTICE IS SENT TO THE SERVER VIA THE OS AND THE LAN DRIVER
S13-6
THE STATUS TABLE IS RESET
INPUT PROCESS FROM THE INPUT DEVICE IS CARRIED OUT
S13-3
END

FIG. 23

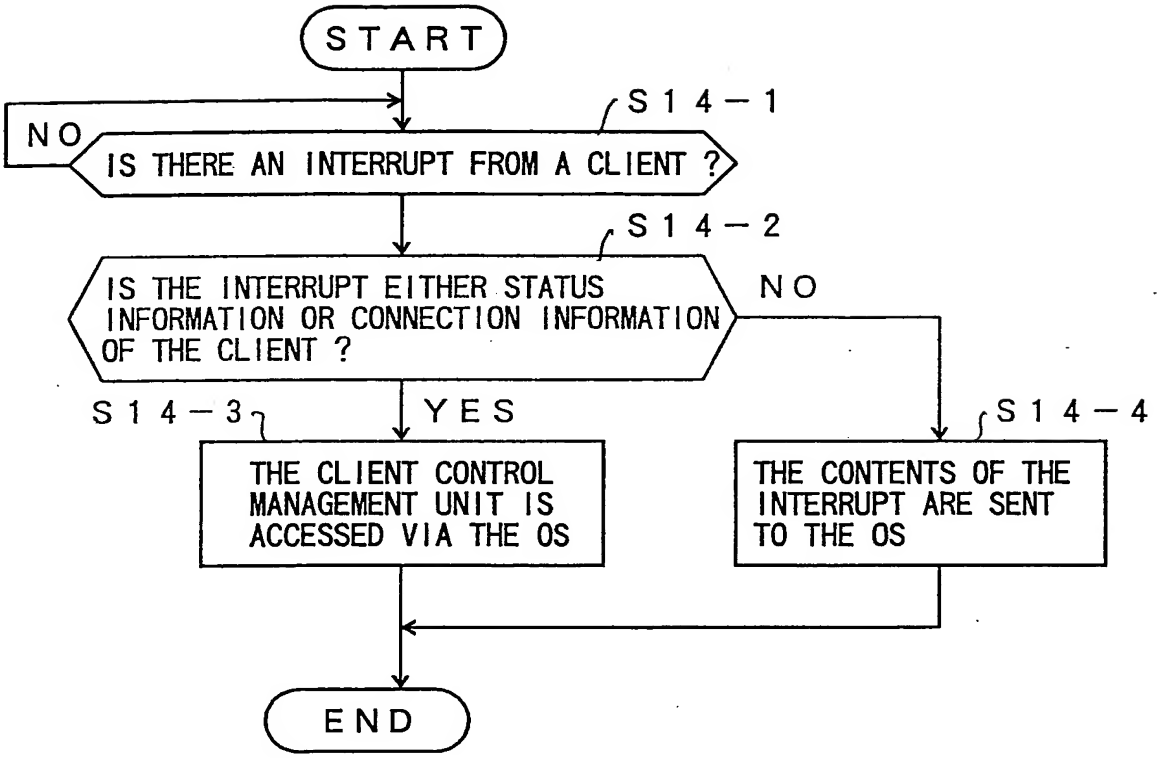

START
S14-1
NO
IS THERE AN INTERRUPT FROM A CLIENT ?
S14-2
IS THE INTERRUPT EITHER STATUS INFORMATION OR CONNECTION INFORMATION OF THE CLIENT ?
NO
S14-3
YES
S14-4
THE CLIENT CONTROL MANAGEMENT UNIT IS ACCESSED VIA THE OS
THE CONTENTS OF THE INTERRUPT ARE SENT TO THE OS
END

FIG. 24

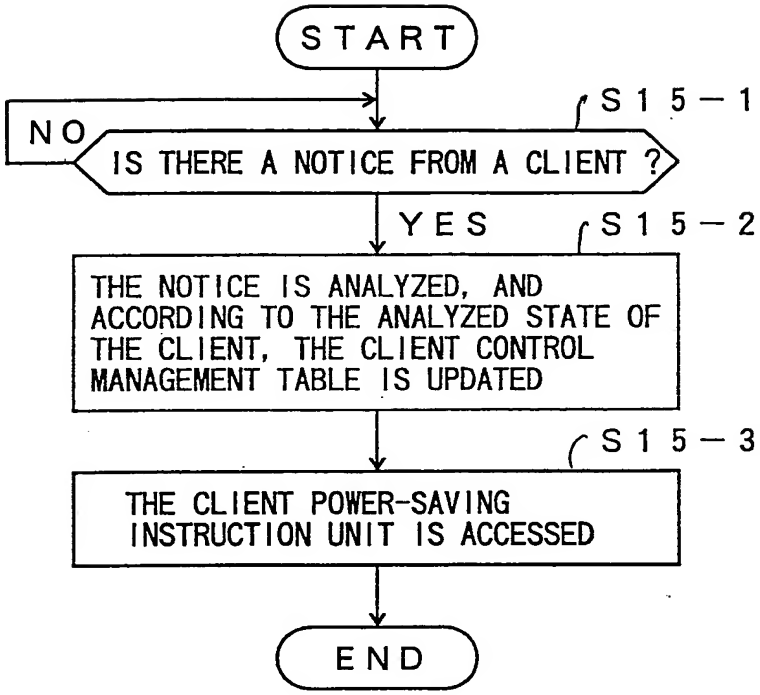

START
S15-1
NO
IS THERE A NOTICE FROM A CLIENT ?
YES
S15-2
THE NOTICE IS ANALYZED, AND ACCORDING TO THE ANALYZED STATE OF THE CLIENT, THE CLIENT CONTROL MANAGEMENT TABLE IS UPDATED
S15-3
THE CLIENT POWER-SAVING INSTRUCTION UNIT IS ACCESSED
END

FIG. 25

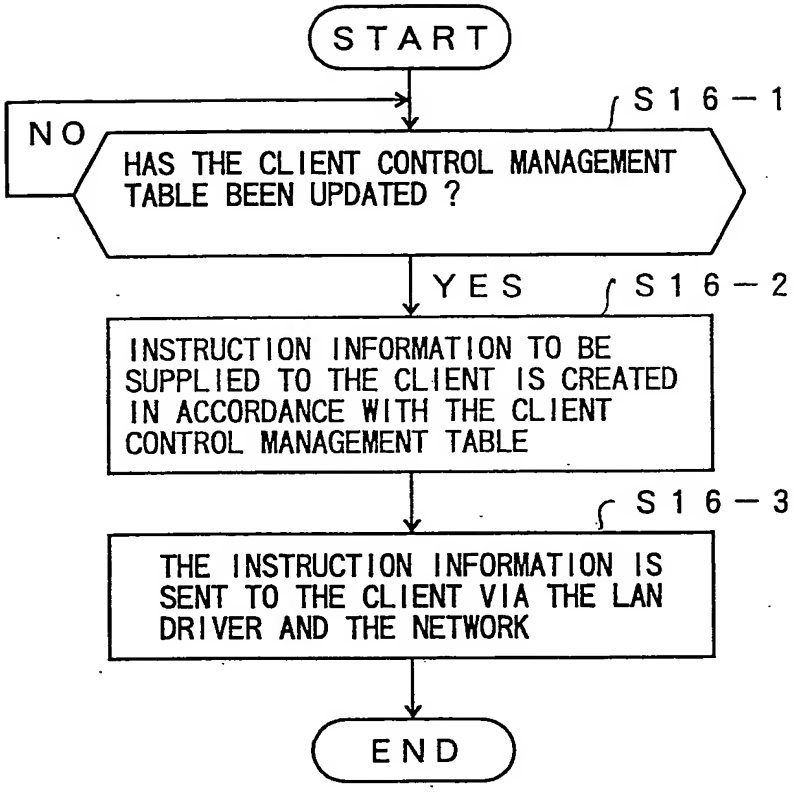

START
S16-1
NO
HAS THE CLIENT CONTROL MANAGEMENT TABLE BEEN UPDATED ?
YES
S16-2
INSTRUCTION INFORMATION TO BE SUPPLIED TO THE CLIENT IS CREATED IN ACCORDANCE WITH THE CLIENT CONTROL MANAGEMENT TABLE
S16-3
THE INSTRUCTION INFORMATION IS SENT TO THE CLIENT VIA THE LAN DRIVER AND THE NETWORK
END

FIG. 26

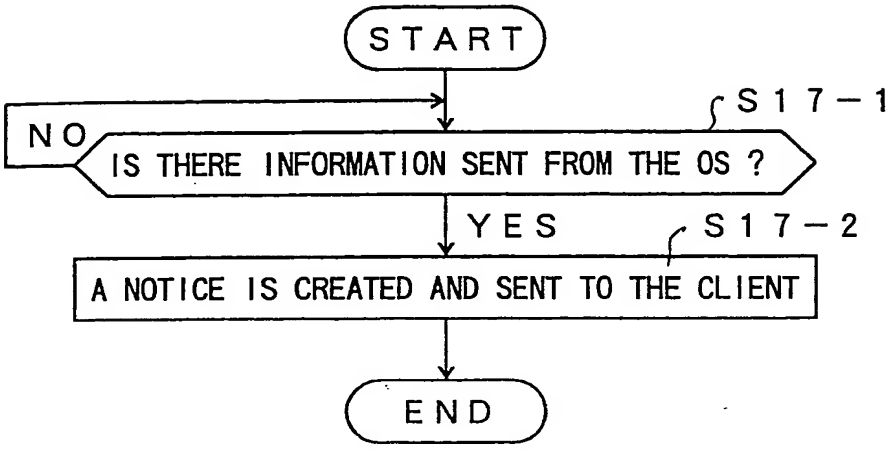

START
S17-1
NO
IS THERE INFORMATION SENT FROM THE OS ?
YES
S17-2
A NOTICE IS CREATED AND SENT TO THE CLIENT
END

FIG. 27

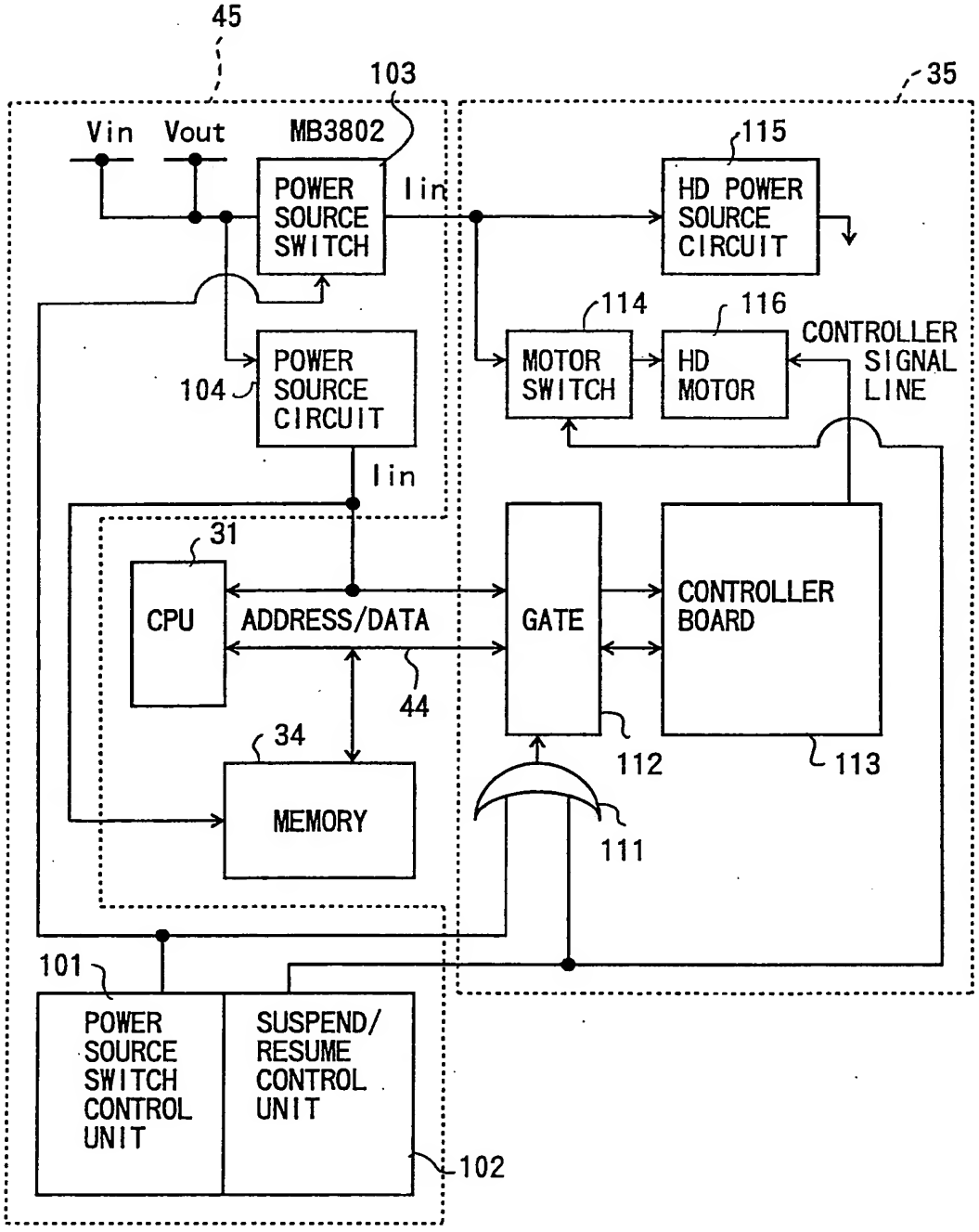
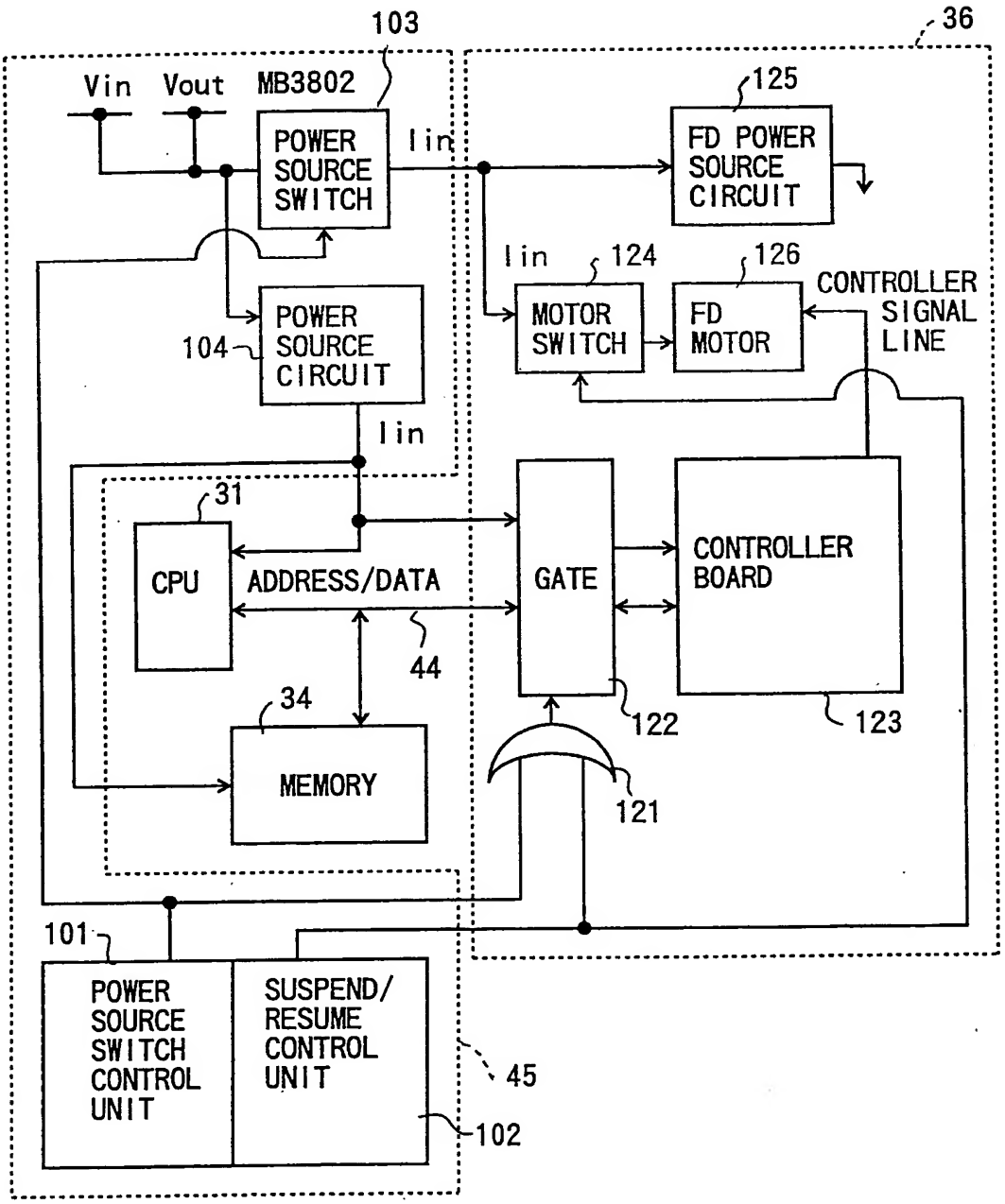

45
103
35
Vin
Vout
MB3802
POWER SOURCE SWITCH
Iin
115
HD POWER SOURCE CIRCUIT
114
116
CONTROLLER SIGNAL LINE
MOTOR SWITCH
HD MOTOR
104
POWER SOURCE CIRCUIT
Iin
31
CPU
ADDRESS/DATA
GATE
CONTROLLER BOARD
44
34
112
113
MEMORY
111
101
POWER SOURCE SWITCH CONTROL UNIT
SUSPEND/ RESUME CONTROL UNIT
102

FIG. 28


103
36
Vin
Vout
MB3802
POWER SOURCE SWITCH
Iin
125
FD POWER SOURCE CIRCUIT
Iin
124
126
CONTROLLER SIGNAL LINE
MOTOR SWITCH
FD MOTOR
104
POWER SOURCE CIRCUIT
Iin
31
CPU
ADDRESS/DATA
GATE
CONTROLLER BOARD
44
34
122
123
MEMORY
121
101
POWER SOURCE SWITCH CONTROL UNIT
SUSPEND/ RESUME CONTROL UNIT
45
102

F I G. 2 9

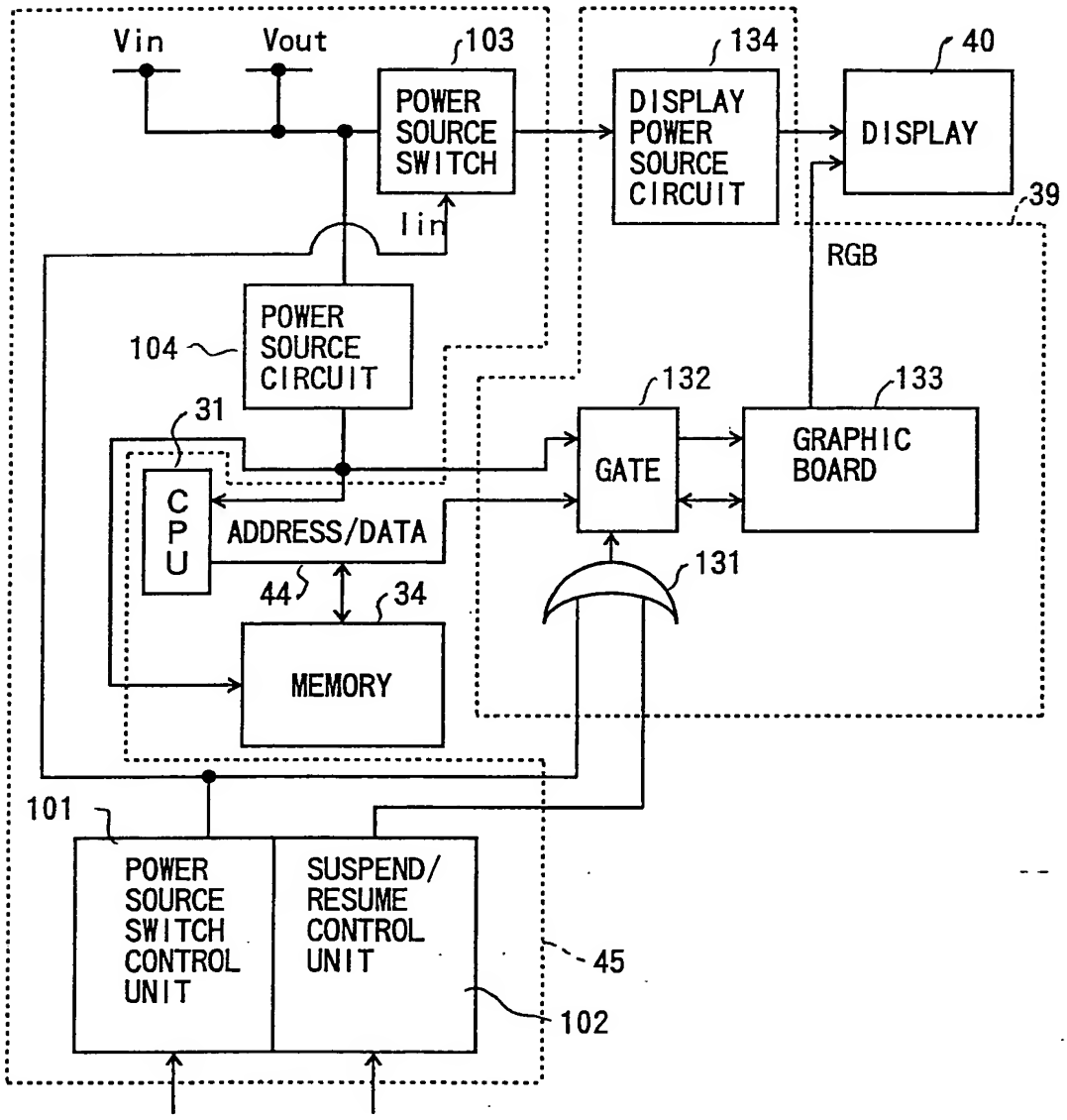

Vin
Vout
103
POWER SOURCE SWITCH
134
DISPLAY POWER SOURCE CIRCUIT
40
DISPLAY
39
Iin
RGB
104
POWER SOURCE CIRCUIT
31
132
133
GATE
GRAPHIC BOARD
C P U
ADDRESS/DATA
131
44
34
MEMORY
101
POWER SOURCE SWITCH CONTROL UNIT
SUSPEND/ RESUME CONTROL UNIT
45
102

FIG. 30

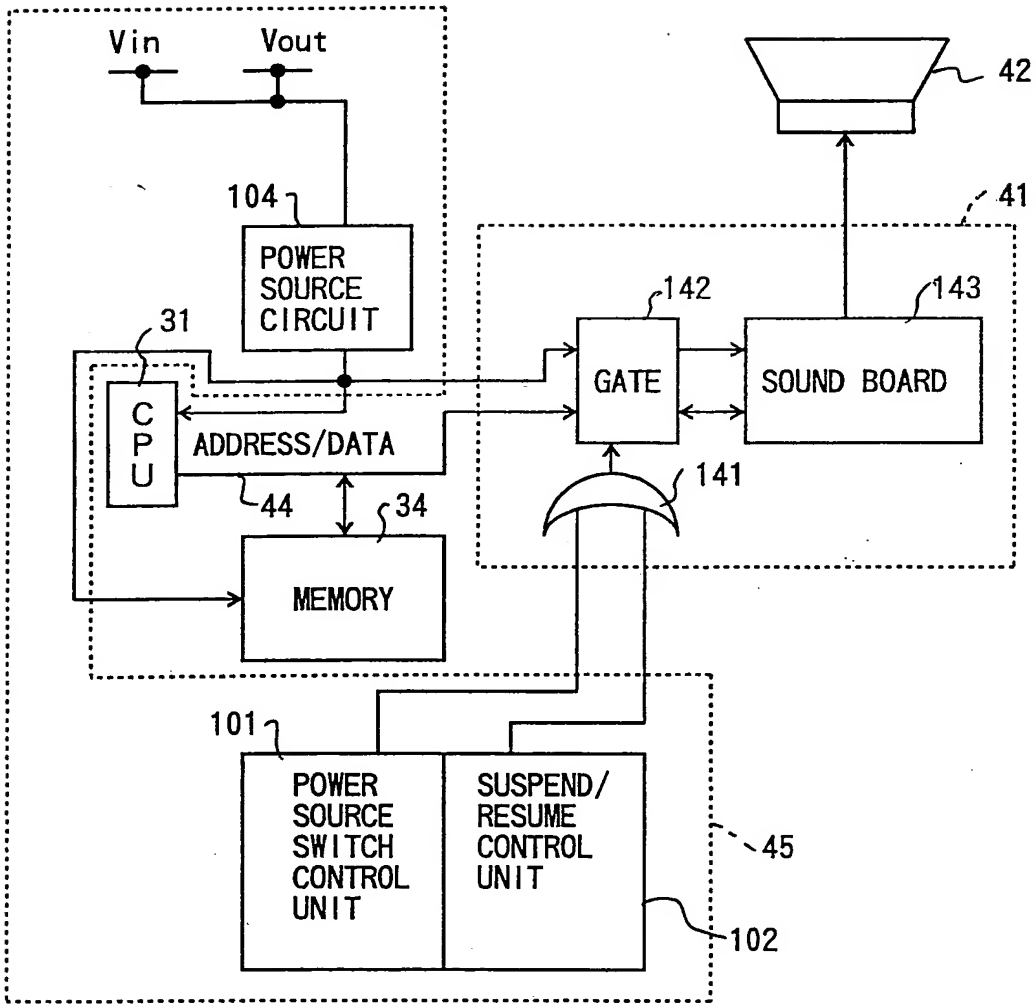

Vin
Vout
42
104
41
POWER SOURCE CIRCUIT
142
143
31
GATE
SOUND BOARD
C P U
ADDRESS/DATA
141
44
34
MEMORY
101
POWER SOURCE SWITCH CONTROL UNIT
SUSPEND/ RESUME CONTROL UNIT
45
102

FIG. 31

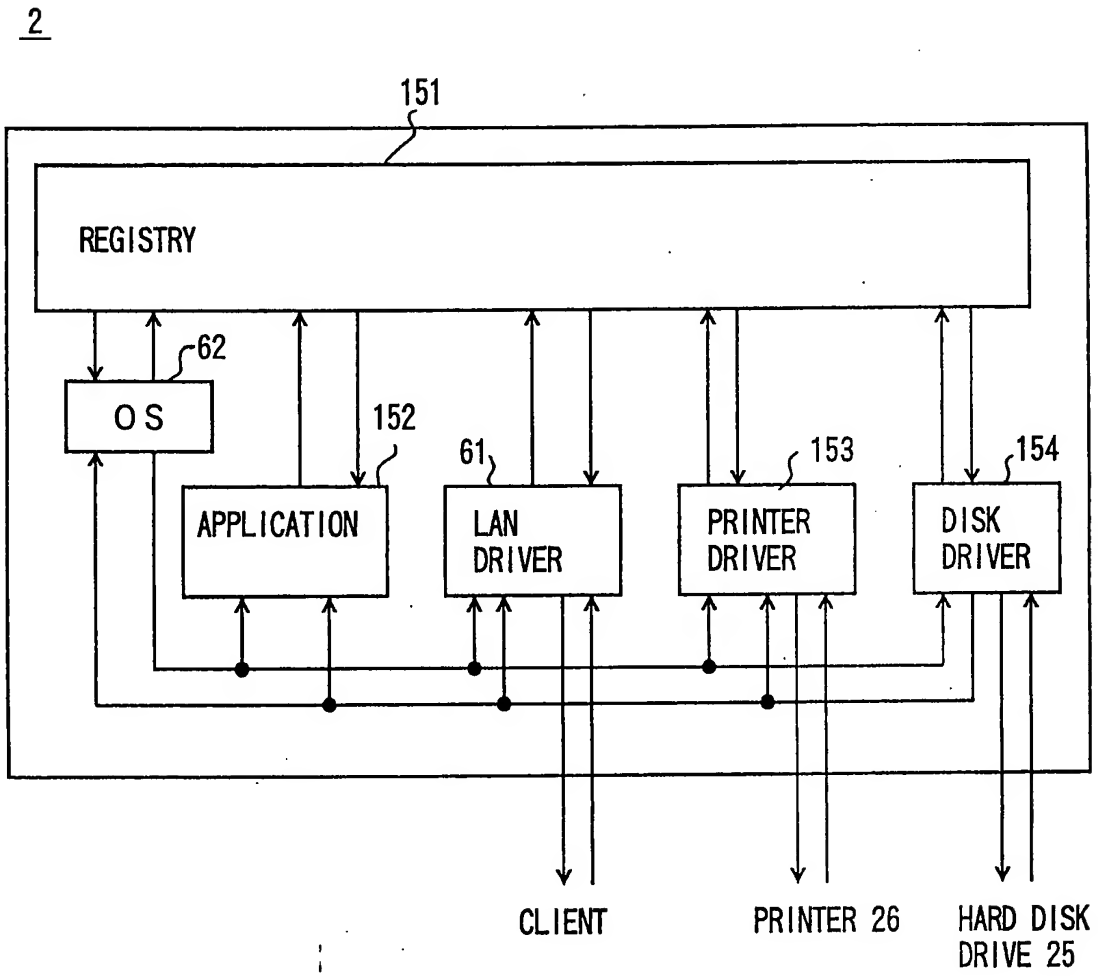

2
151
REGISTRY
62
OS
152
APPLICATION
61
LAN DRIVER
153
PRINTER DRIVER
154
DISK DRIVER
CLIENT
PRINTER 26
HARD DISK DRIVE 25

FIG. 32

151

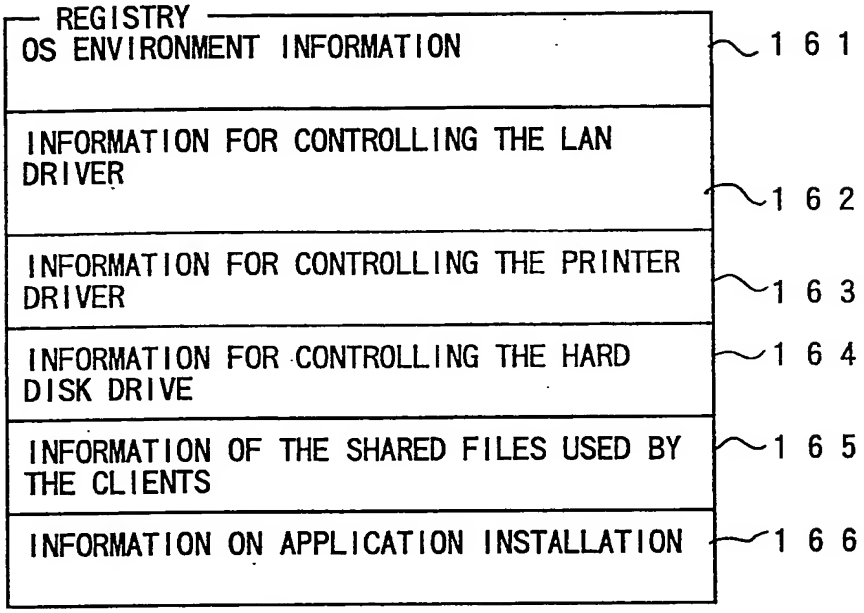

REGISTRY
OS ENVIRONMENT INFORMATION
161
INFORMATION FOR CONTROLLING THE LAN DRIVER
162
INFORMATION FOR CONTROLLING THE PRINTER DRIVER
163
INFORMATION FOR CONTROLLING THE HARD DISK DRIVE
164
INFORMATION OF THE SHARED FILES USED BY THE CLIENTS
165
INFORMATION ON APPLICATION INSTALLATION
166

FIG. 33

165

SHARED FILE INFORMATION

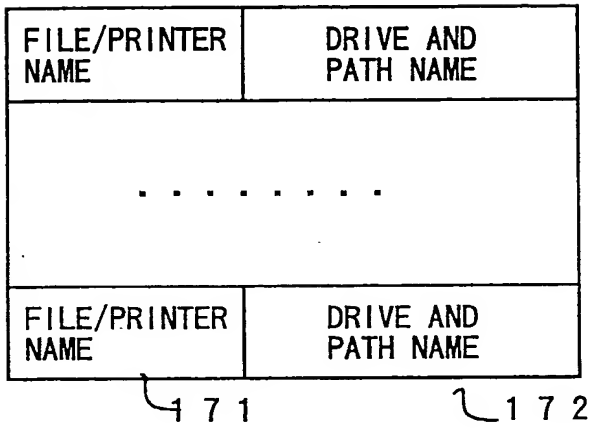


FIG. 34A

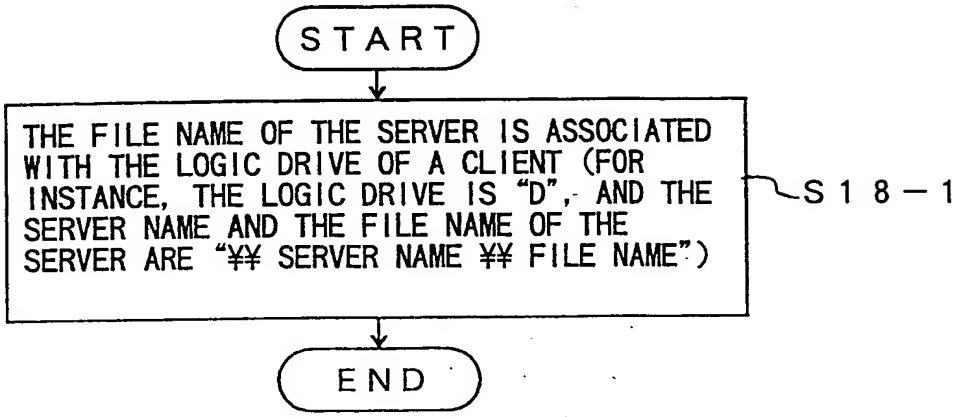


FIG. 34B

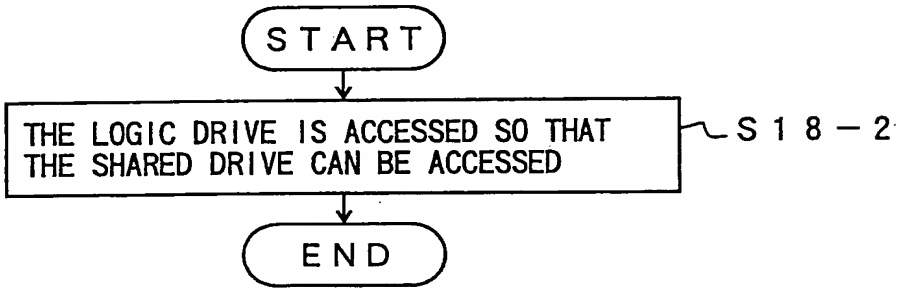


FIG. 34C

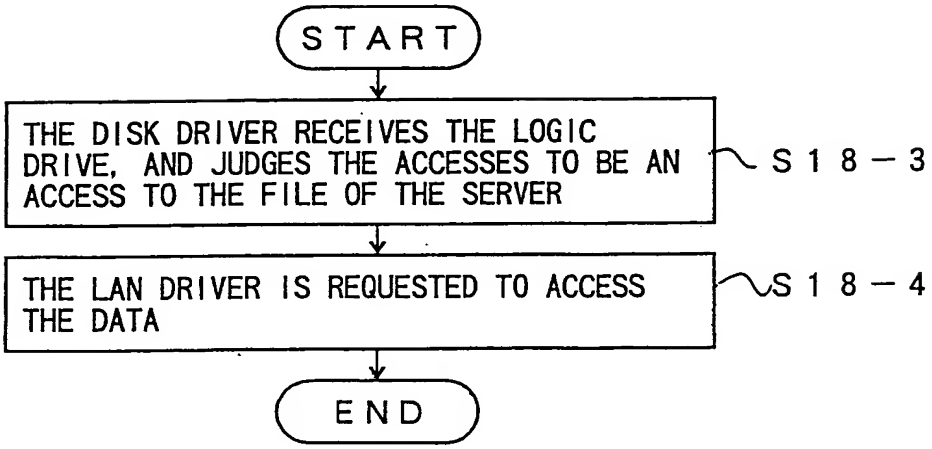


FIG. 35A

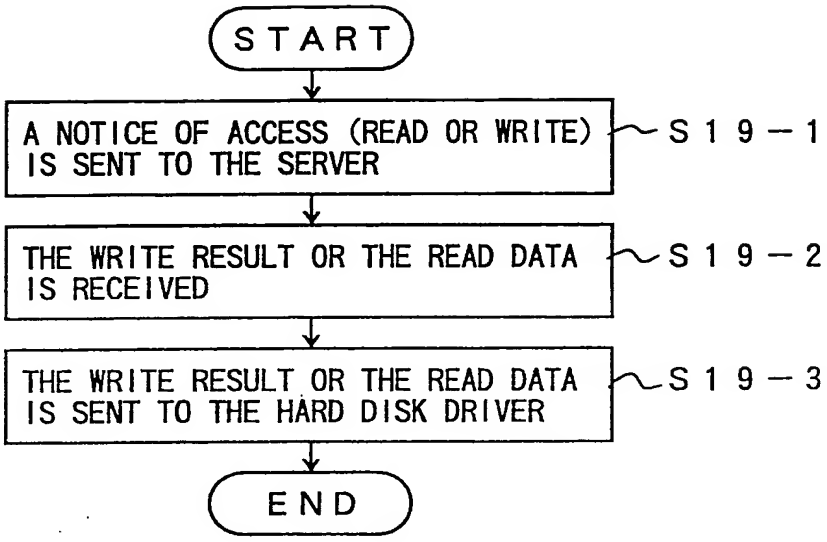


FIG. 35B

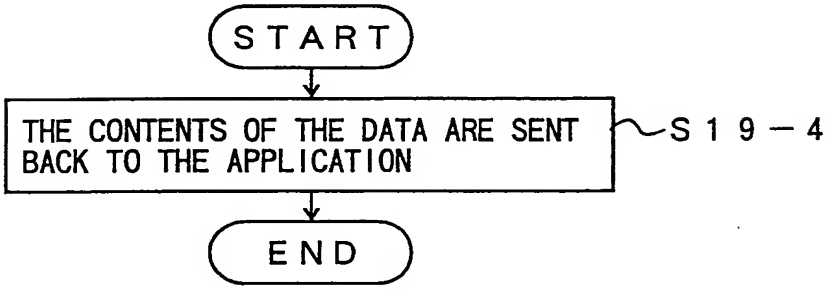


FIG. 36

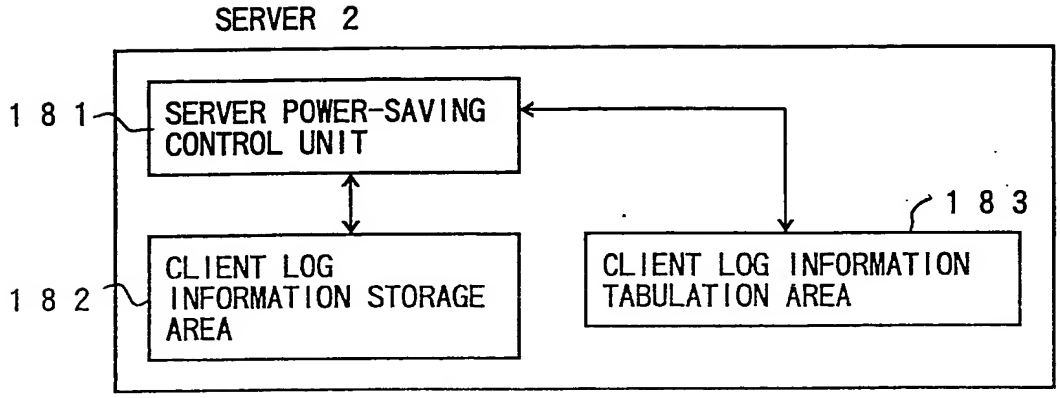

SERVER 2
181
SERVER POWER-SAVING CONTROL UNIT
183
182
CLIENT LOG INFORMATION STORAGE AREA
CLIENT LOG INFORMATION TABULATION AREA

FIG. 37

CLIENT LOG INFORMATION STORAGE AREA 182

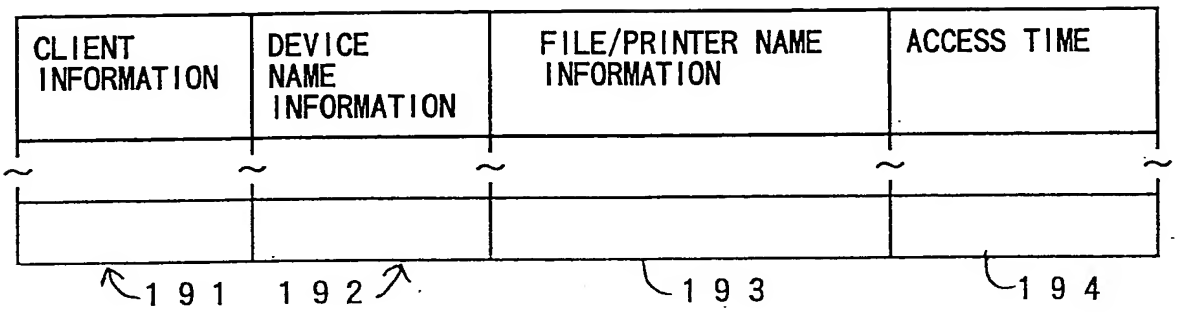


FIG. 38A

CLIENT LOG INFORMATION TABULATION AREA 183

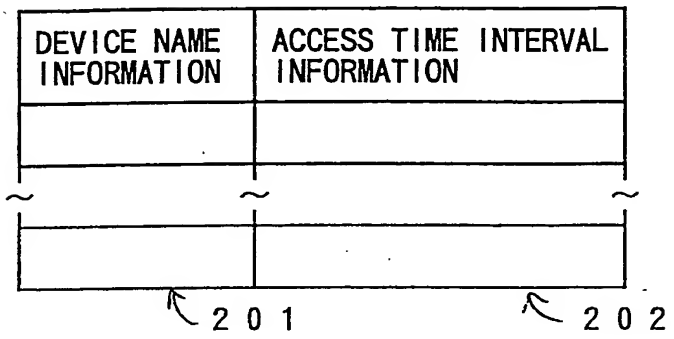


FIG. 38B

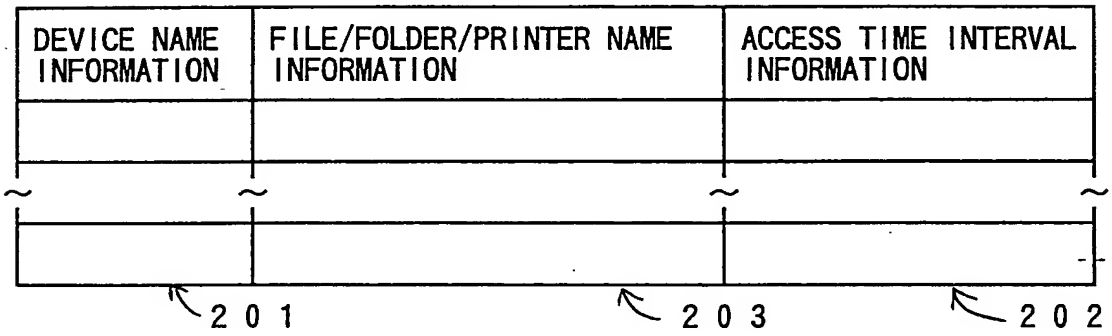


FIG. 39

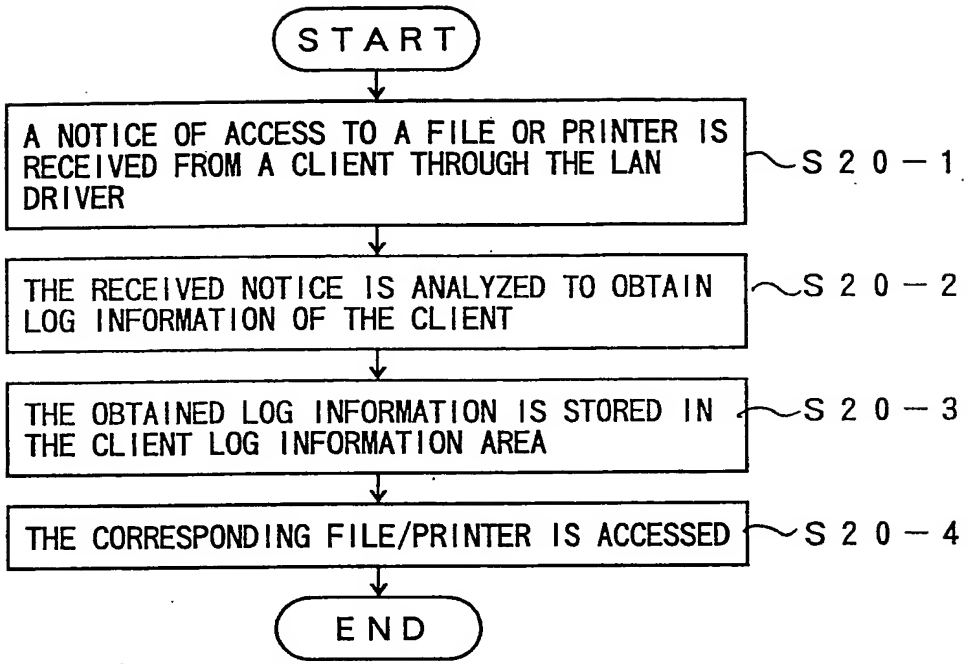

START
A NOTICE OF ACCESS TO A FILE OR PRINTER IS RECEIVED FROM A CLIENT THROUGH THE LAN DRIVER
S 2 0 — 1
THE RECEIVED NOTICE IS ANALYZED TO OBTAIN LOG INFORMATION OF THE CLIENT
S 2 0 — 2
THE OBTAINED LOG INFORMATION IS STORED IN THE CLIENT LOG INFORMATION AREA
S 2 0 — 3
THE CORRESPONDING FILE/PRINTER IS ACCESSED
S 2 0 — 4
END

FIG. 40A

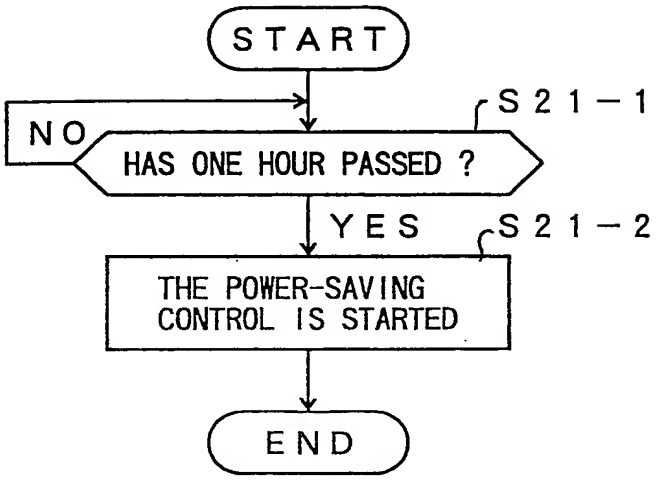


FIG. 40B

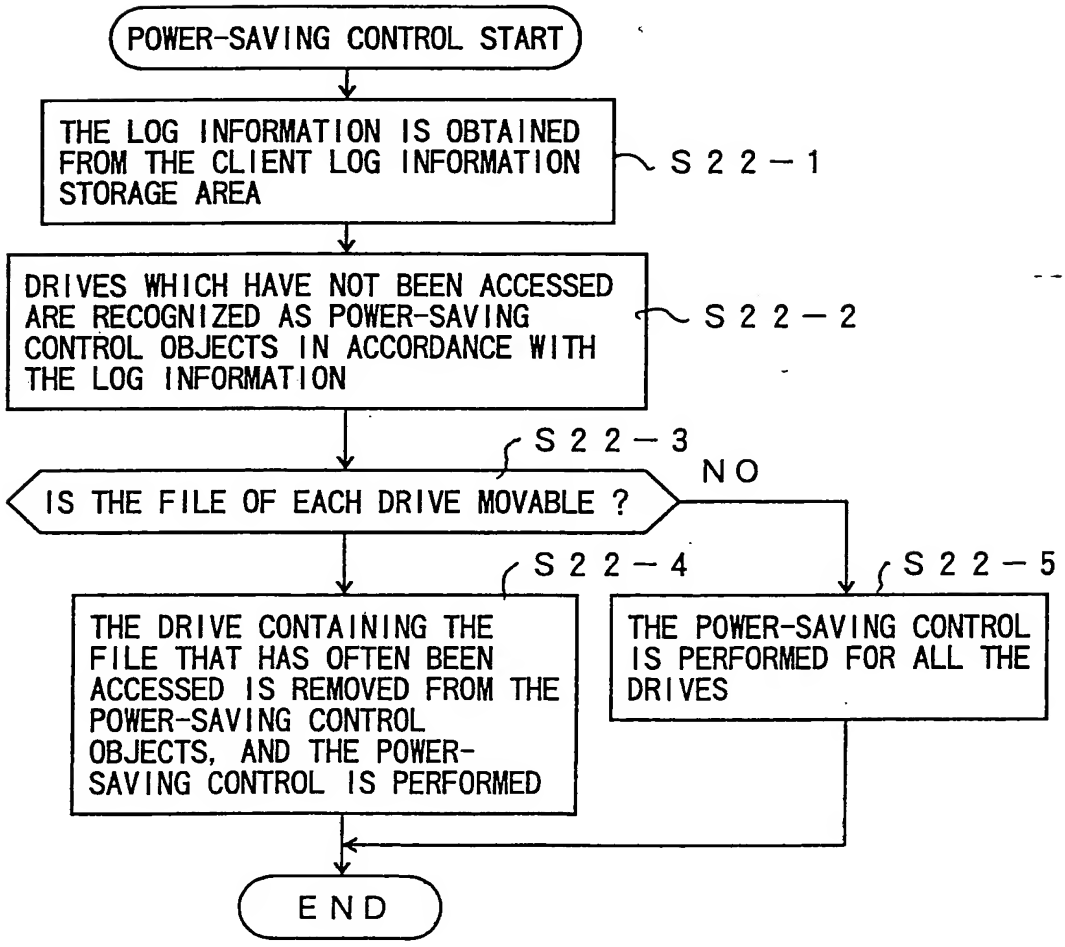


FIG. 41

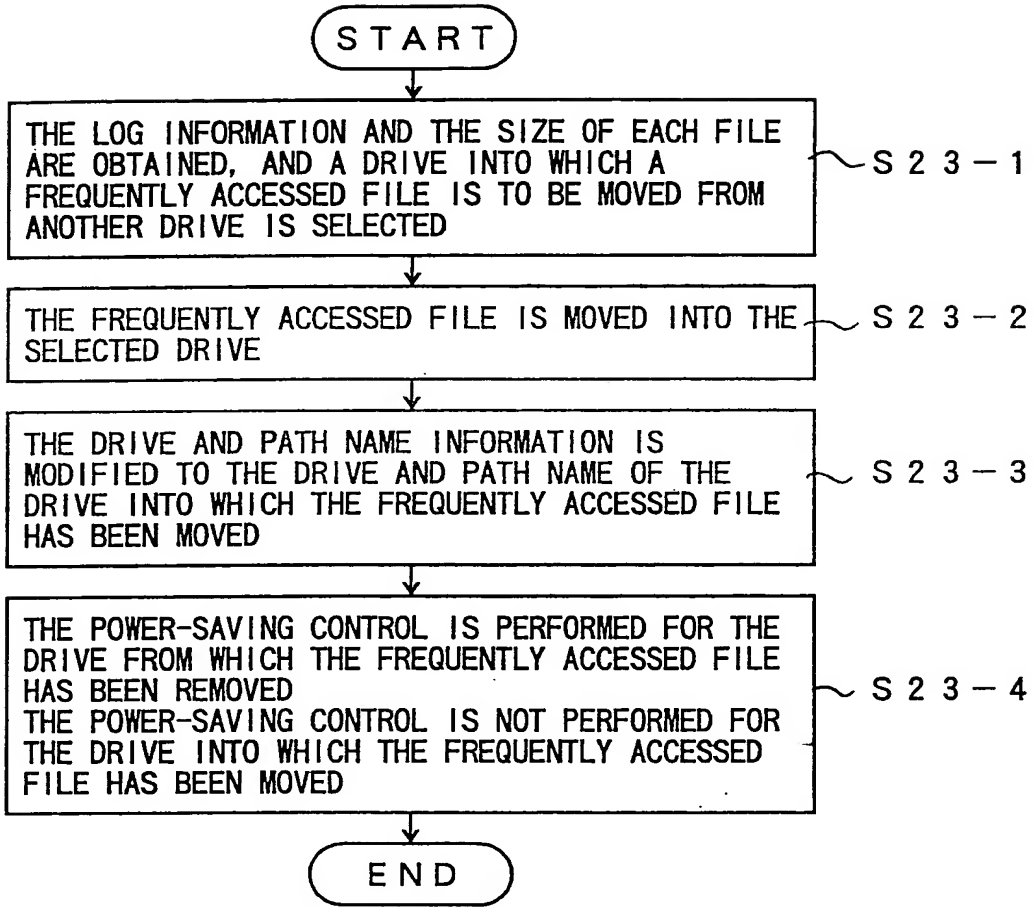

START
THE LOG INFORMATION AND THE SIZE OF EACH FILE ARE OBTAINED, AND A DRIVE INTO WHICH A FREQUENTLY ACCESSED FILE IS TO BE MOVED FROM ANOTHER DRIVE IS SELECTED
S 2 3 − 1
THE FREQUENTLY ACCESSED FILE IS MOVED INTO THE SELECTED DRIVE
S 2 3 − 2
THE DRIVE AND PATH NAME INFORMATION IS MODIFIED TO THE DRIVE AND PATH NAME OF THE DRIVE INTO WHICH THE FREQUENTLY ACCESSED FILE HAS BEEN MOVED
S 2 3 − 3
THE POWER-SAVING CONTROL IS PERFORMED FOR THE DRIVE FROM WHICH THE FREQUENTLY ACCESSED FILE HAS BEEN REMOVED
THE POWER-SAVING CONTROL IS NOT PERFORMED FOR THE DRIVE INTO WHICH THE FREQUENTLY ACCESSED FILE HAS BEEN MOVED
S 2 3 − 4
END

FIG. 42

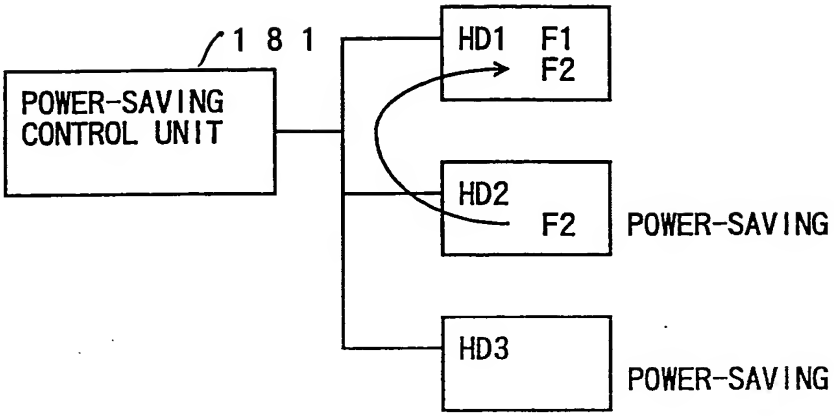

181
POWER-SAVING CONTROL UNIT
HD1 F1
F2
HD2
F2
POWER-SAVING
HD3
POWER-SAVING

FIG. 43A

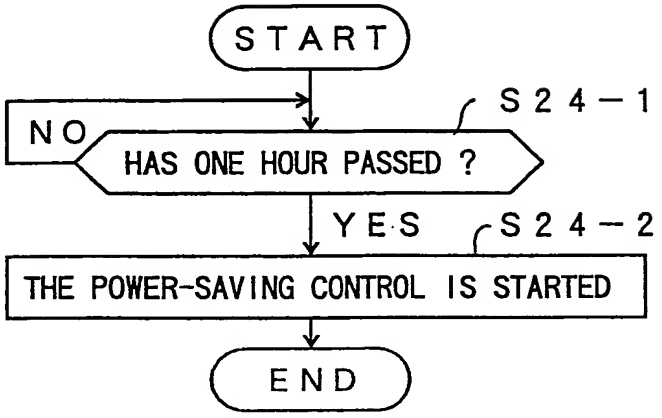


FIG. 43B

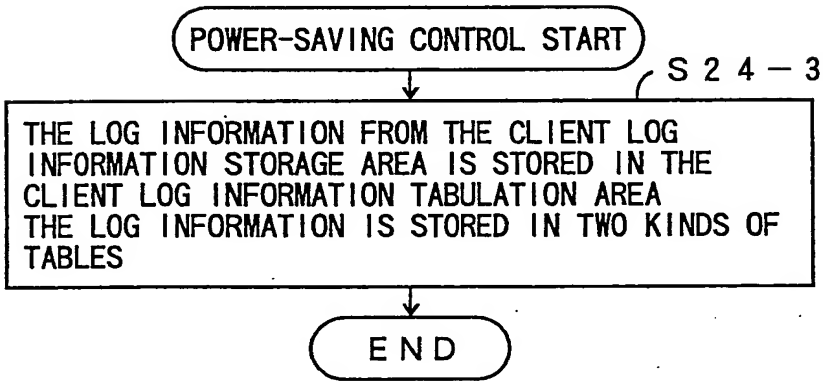


FIG. 43C

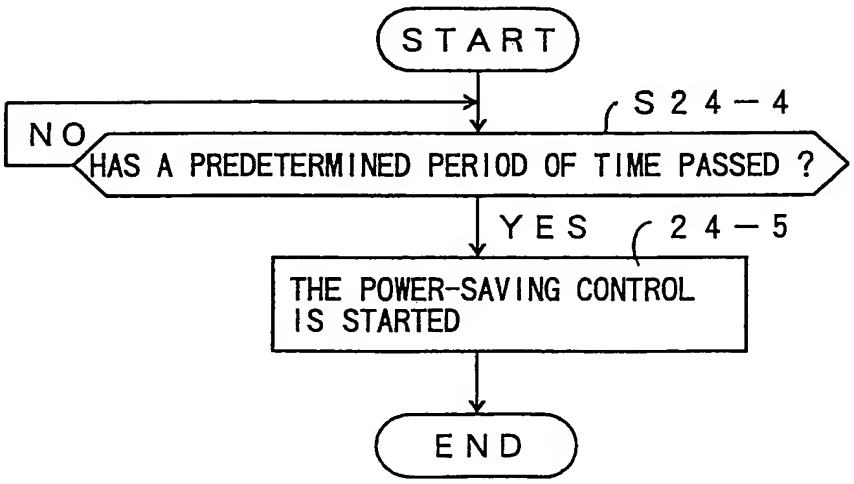
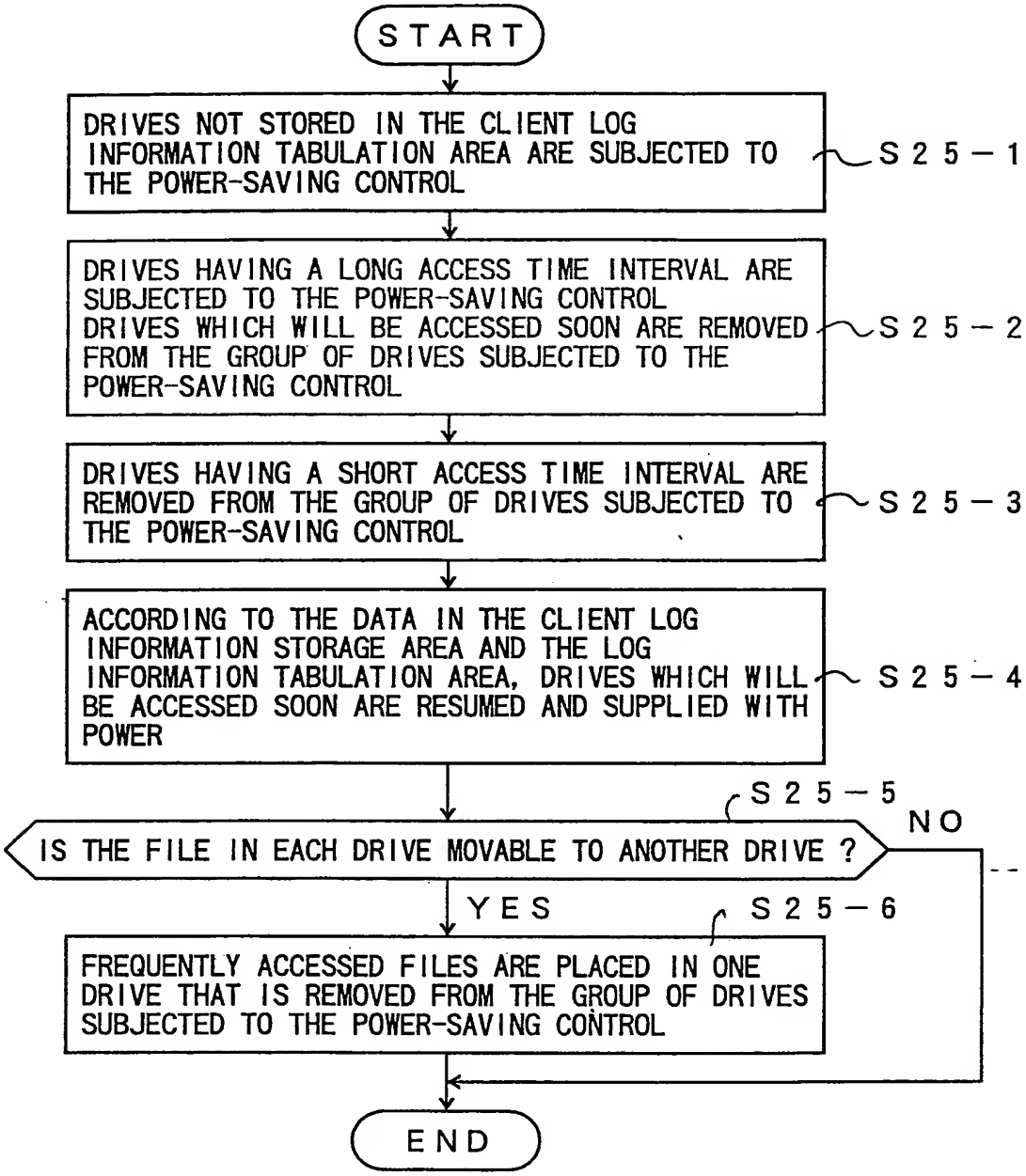


FIG. 44


START
DRIVES NOT STORED IN THE CLIENT LOG INFORMATION TABULATION AREA ARE SUBJECTED TO THE POWER-SAVING CONTROL
S25-1
DRIVES HAVING A LONG ACCESS TIME INTERVAL ARE SUBJECTED TO THE POWER-SAVING CONTROL DRIVES WHICH WILL BE ACCESSED SOON ARE REMOVED FROM THE GROUP OF DRIVES SUBJECTED TO THE POWER-SAVING CONTROL
S25-2
DRIVES HAVING A SHORT ACCESS TIME INTERVAL ARE REMOVED FROM THE GROUP OF DRIVES SUBJECTED TO THE POWER-SAVING CONTROL
S25-3
ACCORDING TO THE DATA IN THE CLIENT LOG INFORMATION STORAGE AREA AND THE LOG INFORMATION TABULATION AREA, DRIVES WHICH WILL BE ACCESSED SOON ARE RESUMED AND SUPPLIED WITH POWER
S25-4
S25-5
IS THE FILE IN EACH DRIVE MOVABLE TO ANOTHER DRIVE ?
NO
YES
S25-6
FREQUENTLY ACCESSED FILES ARE PLACED IN ONE DRIVE THAT IS REMOVED FROM THE GROUP OF DRIVES SUBJECTED TO THE POWER-SAVING CONTROL
END